

# COMPUTER WORLD

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## Where Do You Stand?

After visitors to "The Revolution" Bicentennial exhibition have made their decisions on how they would have acted in pre-Revolutionary days, a computer donated by Honeywell evaluates the ballot. Visitors are then compared to famous Bostonians of the period. See story on Page 4.

## Seen Affecting Sales

# Honeywell Policy Upsets Users

By Nancy French

CLEVELAND Honeywell's decision to charge owners of used computers a software license fee and its refusal to guarantee maintenance on machines that are sold by individuals on the used-computer market are bound to have ramifications on the sale of new equipment, Bill White, president of the Honeywell Users Group for Small and Medium Systems, said after the group's recent meeting here.

People at the meeting were "extremely unhappy" because Honeywell has, in effect, devaluated their equipment by the price of the software, White explained.

Over the years it has been Honeywell's policy to sell a user's computer after he has leased it for a certain period of time.

Now purchasing will be a bad decision for the user because he's going to have to buy that software from Honeywell and

offer it with the system when he doesn't get his money's worth, White said.

Users who purchased systems recently from sources other than Honeywell and were worried about paying enormous prices for software were relatively relieved about Honeywell's recent price concession [CW, Nov. 12]. Further new policies won't hurt the user who plans to keep a system well beyond its economic life, but the average user is going to hesitate before purchasing any system he is now leasing, White predicted.

### Nothing But Frauds

But Jesse Williams, vice-president of General Service Center, Inc. of Memphis, who also attended the meeting, had a different view.

"I think Honeywell's done all right by us. It's supported us and I can do nothing but praise Honeywell," he said.

"Honeywell's got to make a

profit to stay in business, doesn't it? Why should I carry the load for people who buy from sources other than Honeywell? Why shouldn't these other sources contribute to Honeywell's profit base the same as I do and reduce some of my costs?" Williams asked.

General Service Center has an H200 and an H2015 and the firm is going into OS/2000 right now. All equipment was obtained from Honeywell.

(Continued on Page 4)

# Loopholes Said to Exist in All Systems

By Edward J. Brinde

Or the CW Staff

NEW YORK Loopholes which facilitate DP-aided fraud exist in all business systems, either by design or oversight, according to Leonard I. Krauss, manager of Ernst and Ernst's Management Consulting Services.

It is, therefore, necessary for managers to "have a formalized approach" to fraud analysis, including "multiple lines of defense" against perpetrators.

"There are no perfect answers," Krauss told attendees at the Second Annual Computer Security Conference Workshop held here recently. Management must therefore get "reasonable" answers.

Computer crimes tend to be 100 times more profitable than traditional non-computer crimes, Krauss said. He used the example of a recent bank fraud which resulted in a loss of \$1 million, while under similar circumstances in earlier days, the loss "would probably have netted \$10,000 or so."

Donald Parker of the Stanford Research Institute indicated

years ago, she said last week. MAC is the New York State-based sponsored organization responsible for floating bonds for the city to help it avoid default. The question it raised in July was "perfectly intelligent," Letowitz admitted, but apparently "no one had ever made an attempt to automate in any way, shape or form how much the city was going to spend over the next X months."

Payroll projections are fairly simple, she explained, but capital projects are completely different. Contract liability, for example, can be paid off in three months, or in 10 years, so a lump sum of that liability doesn't provide any real information.

Letowitz had been working with Mark IV before she went to work for the city five years ago. And the city had Mark IV on one of its computers, though it was not being used to any great extent, she said.

In any case, Assistant Budget Director William J. Sharkey and Letowitz began sharing together the requested program, and the software coding to manipulate the data in July. Just about that time, the Emergency Financial Control Board (EFCB) assumed power at a level higher than MAC and asked for projections reaching three years into the future.

Sharkey made a "hallpark"

guess of what the overall figure would be and agency heads were asked to provide estimates of what their particular operations would require for capital projects over the coming 36 months. The sum of the individual projections was very close to the grand total guess Sharkey made earlier. Letowitz added.

The people who reviewed those initial projections "were pretty much flabbergasted" by the grand total, she went on. They started looking at the individual figures far more closely than they had before and began chopping with a vengeance and a clear direction.

### Austere Budget

It wasn't surprising to see the totals drop by \$100 million as each set of new projections was posted, she said. In any case, a more austere but better understood picture of the city's future financial budget projects emerged.

Since then, Letowitz has entered the actual expenditures of each agency as they become known at the end of each month. Thus far, she noted, the "actuals" have tended generally to be under the projected figures for the month. But, she cautioned, that doesn't mean anything because "all of a sudden, one month, a bunch of big bills can come in."

(Continued on Page 4)

# Government, IBM Await Vacating of 'Gag Rule'

By Edith Holmes

Or the CW Staff

NEW YORK — Now that they have deemed the gag rule in the U.S. vs. IBM antitrust suit unconstitutional, both the government and IBM expect the federal district court judge hearing the antitrust case to designate Preliminary Order No. 4 null and void momentarily.

Even though IBM originally asked that communication between the parties and the public and press be restricted, and the government assented to the en-

tering of the order in May 1972, the parties recently presented the court here with briefs arguing the gag rule's unconstitutionality.

The government's brief was filed with the court at Judge David N. Edelstein's request following IBM's motion that Preliminary Order No. 4 be vacated [CW, Nov. 12].

"There can be no doubt about the unconstitutionality of Preliminary Order No. 4," IBM argued in its memorandum asking the

(Continued on Page 2)

# L.A. Man Charged in Theft Of T/S Company's Time

LOS ANGELES A 42-year-old DP executive accused of stealing computer time and using someone else's password to gain access to the system, has been arraigned in municipal court here.

Charged with one count of grand theft and four counts of grand fraud, Marvin H. Maki was released on his own recognizance pending a preliminary hearing on Dec. 9.

Maki, employed by W&R Tool and Manufacturing Co. of North Hollywood, is suspected of hav-

ing used computers owned by Manufacturing Data Systems, Inc. (MDS), a time-sharing firm, to process data for W&R Tool.

Maki, who worked for MDSI until June, allegedly used information learned as an MDSI employee to gain access to that firm's computer systems.

After Maki left MDSI, the firm (MDSI) time-sharing firm, Pars discovered they were being billed for computer time he had not used.

MDSI officials suspect Maki (Continued on Page 4)



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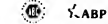
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# Brief Says Software Patent Should Stand

By Don Levitt

WASHINGTON, D.C. — The U.S. Patent Office has no jurisdictional right to take the Thomas R. Johnston case to the U.S. Supreme Court — but as long as the court has agreed to review the matter [CW, May 21], there are plenty of arguments in favor of allowing Johnston's patent for software to stand, according to his attorney.

Oral arguments before the high court

are now scheduled for Tuesday, Dec. 9. In a 70-page brief filed recently, attorney Morton C. Jacobs contended the Patent Office had no legal grounds on which to challenge the findings of its own Board of Appeals and of the Court of Customs and Patent Appeals (CCPA), each of which ruled in favor of the inventor after the Patent Office rejected his application.

Johnston is seeking patent protection for a bookkeeping system for small busi-

nesses. The system is based on encoding and later sensing of extra digits in the magnetic ink character recognition (MICR) stripes at the bottom of the user's checks and deposit slips handled by a bank.

The logic of the system is embedded in software programs which, in Jacobs' eyes, convert the general-purpose computer in which they execute into a special-purpose machine. If a machine meets certain other criteria, it is legitimate subject matter for patent protection.

## Patentable as Machine

Johnston's invention is patentable as a machine, Jacobs asserted in his brief, because it is indeed a "new machine." It "achieves a unique end result without [in the words of the CCPA ruling] a human being inside or outside [the apparatus]," the attorney contended.

The Patent Office argued Johnston merely has a new use for an old machine. That argument "is directly contradicted by [the Patent Office's] own concession of the 'possibility of patentability' of software-embodied inventions and by the facts of the nature of programmed computers," Jacobs went on.

"The program reconstructs the computer," he said, quoting Prof. Ivan Flores, and added the Patent Office, in its *Guidelines for Examination of Computer Programs*, recognized the stored program "converts the 'warehouse of unrelated parts' of the general-purpose computer into a 'special-purpose machine.'"

The Patent Office Board of Appeals followed essentially that idea when it overturned the first denial of Johnston's application, he said.

Hardware and software programming are equivalent and alternative approaches for the construction of computer systems and, as such, are equally patentable, Jacobs told the court.

"The Patent Office's 'new use' argument does violence to the technological facts of computers," he added a few pages later. Pursuing the contention that hardware and software may provide equivalent approaches to building computer systems, the attorney built an argument based on the requirement for "equal protection" under the law.

Without the sense of protection afforded by patent rights, software inventors would have no incentive to pursue their work, he said.

And, without software, the general-purpose computer of today has little value, Jacobs added.

# U.S. Government, IBM Expecting Edelstein to Overturn Gag Rule

[Continued from Page 1]

judge to vacate the "gag rule." Relying on a case decided this summer which related to the rights of the parents, family and friends of those students killed at Kent State University in 1970 to talk to the press about their cases, attorneys for IBM contended that in the government's suit, as in *CBS, Inc. v. Hon. Don J. Young*, the First Amendment right to freedom of speech should hold sway.

Gag rules are only applicable where coverage of a case by the press will threaten the fairness and integrity of a trial, the defense said. And the attorneys added, "There is no jury here, as there was in *CBS v. Young*, susceptible to influence by publicity."

Government attorneys, too, determined the gag rule unconstitutional and asked that it be vacated.

The Department of Justice noted it was very little precedent on which to assess the constitutionality of a gag rule in a civil trial where a judge alone will decide the case.

"Most of the standards that have developed concerning press publicity involve criminal cases in which the defendant's Sixth Amendment right to a speedy and public trial by an impartial jury is jeopardized," the government said.

"Any restrictions imposed upon public comment, even if necessary to assure a fair trial, tend to clash with First Amendment interests," the plaintiff in this suit noted further.

## Less Justified

The government cited a case in which an appellate court decided "no-comment rules [are] generally less justified in civil

proceedings than in criminal proceedings" because a civil trial like U.S. vs. IBM often does not have a jury.

A judge is expected to be able to ignore out-of-court comments and to separate and weigh the relevant evidence presented in court in his or her mind, the attorneys added.

In addition, the government noted "civil litigation will ordinarily be more protracted criminal litigation so that the 'broad time span' of a no-comment rule is an influential factor weighing against its constitutionality."

## Witnesses Influenced

Witnesses may be influenced by media accounts of a trial or the comments of the lawyers involved concerning their testimony; out-of-court comments by the parties may have a significant impact upon the industry that stands to be affected by the litigation; and both the parties and the judge will have the responsibility for responding to numerous press inquiries and addressing disputes over the accuracy of statements made in the course of a lengthy trial.

But, the government noted, the court did not base *Fretwell Order No. 4* on these considerations; instead, the judge imposed the gag rule on the basis of an interest in "accurate, objective, dispassionate and fair comment and reporting."

While concluding that the gag rule should hold no longer, the government seemed to anticipate publicity excesses once the order is lifted and warned at the dose of its memo, "It is to be expected that counsel in this litigation will conduct themselves in a manner befitting their status as officers of the court."

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## With \$250 Million Already Spent

# Congress May Force End to Air Force Inventory Project

By Patrick Ward  
Of the CW Staff

WASHINGTON, D.C. — The U.S. Air Force may soon be forced to abandon an "overambitious" data base/data communications project that has already cost about \$250 million but remains far from completion.

The House of Representatives has voted to terminate the project, the Advanced Logistics System (ALS). The Air Force and the Senate Appropriations Committee, however, favor a "get-well" plan that would switch the project from an on-line to a batch-oriented operating system.

Even this alternative would take two years and cost \$481 million in development and operating costs through 1982, the Air Force said.

But the Air Force estimated the revised ALS system will still save it \$307 million over the next seven years, primarily in manpower savings and inventory reductions.

Began in 1968, ALS was to bring the latest in computer technology and management techniques to Air Force inventory management. But the project "turned out to be too much to swallow," in the view of a House Appropriations Committee spokesman.

The Air Force tried to jump from second-generation to fourth-generation DP technology in one leap, according to a spokesman for the Senate Committee on Appropriations.

The plan called for seven large-scale CPUs in five Air Force logistics centers around the country. Each logistics center would have a unified data base replacing "many independent and hence often inconsistent" data bases on other machines. In all, the seven third-generation ALS computers would have replaced about 90 second-generation machines, including IBM 1401s and 7080s, Univac 1107s and RCA 301s.

Each logistics center would be linked with the others over dial-up lines. Each center would also support about 500 data

## Davis Warns Privacy More Than Security

WASHINGTON, D.C. — Privacy is more than system security — it involves such concerns as data collection, information management practices, auditing and systems and software integrity as well as systems and network controls, encryption and physical security. Dr. Ruth Davis told the Privacy Protection Study Commission recently.

Davis, director of the National Bureau of Standards' Institute for Computer Sciences and Technology, called for the commission to determine the present state of the art, pinpoint its deficiencies and make a contribution by focusing research in needed areas.

Research and development presently under way in privacy-oriented areas is "fragmented and not focused," she said.

Most of the projects "are described as computer or information system security research and development" and their results are often applicable to privacy problems, even though they were not so justified initially, she said.

Among those "fragmented" projects Davis cited were 13 privacy-related projects now going on within the Department of Defense (DOD), the National Science Foundation (NSF) and the National Bureau of Standards, as reported by the Smithsonian Scientific Information Exchange.

In the private sector, about 20 different organizations are conducting significant research in information protection and related activity, she said.

entry and keyboard/printer terminals to provide "current and consistent information to all ALS users," the Air Force said. The plan envisioned an average of about 50 112M-character disk drives at each site. The entire ALS system was to process some 72,000 transaction/hour around the clock.

### CDC Reliability 'Disappointing'

In April 1972, Control Data Corp. won the bidding to provide ALS hardware and software. The large process was to be 65K word Cyber 73s and Cyber 74s, with SC 1700 small computers handling communications at each site.

"Although the Cyber CPU had speed and versatility, the reliability of the equipment was disappointing," the Air Force said in a follow-up report.

"Failures of key components such as extended core storage, remote devices and some communications interface computers hampered operations."

"Extended core storage failure taking only 30 minutes to repair can cause a production delay lasting much longer," the Air Force reported.

Though the original intention was to rely on off-the-shelf proven software, ALS became the first operational user of CDC's Zodiac transaction-oriented operating system, according to Robert M. Flaherty, chief system engineer at Wright-Patterson Air Force Base.

"About 1,500 program trouble reports were submitted against Zodiac software. Of this... approximately 180 were catastrophic," the Air Force report noted. Housekeeping functions such as "con-

trol, insuring data integrity, opening and closing files and preventing systems from interfering with each other" took excessive system resources, the Air Force said.

"The data base structure, designed with many family tree branches and... keys, fosters excessive consumption of processor time," according to the Air Force. However, the elaborate structure "does permit user flexibility."

Because of these and other difficulties, only two of the large-scale computers are now doing production work. If the House prevails, the Air Force will drop further work on the project.

The Air Force and the Senate Appropriations Committee, however, think it unrealistic to expect this equipment mix to handle an adequate inventory management program.

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## Patriot or Loyalist?

# Mini Analyzes Political 'Spirits of '76'

By Nancy French

Of the CW Staff

**BOSTON** — Patriot, loyalist, neutral or undecided?

A Bicentennial exhibit here is using a computer to answer that question for thousands of visitors to this city by analyzing their opinions on political issues of the Revolutionary period.

Visitors are shown multimedia presentations on such things as the Stamp Act, the Boston Massacre, the Boston Tea Party and the siege of Boston. After each presentation, they are asked to vote on the issue.

Those considering the Tea Party, for

example, can choose between unloading the cargo or dumping it into Boston Harbor.

On the stage of Boston, they can decide to leave their homes and join the patriots' cause or stay put and take their chances. Visitors enter their choices on a CRT terminal and a minicomputer analyzes the responses. It then compares the visitor to a prominent Revolutionary figure who had similar political leanings and the information is displayed on the screen.

One such comparison told the voter, in part, that "like Daniel Leonard, you began as a lukewarm patriot and ended up as a loyalist."

## 'Mark' Helps MAC Keep New York Afloat With Cash-Flow System

(Continued from Page 1)

Despite that justified concern, the system has proved detailed projections, the facility to modify those estimates and the means to compare them to actual experience.

Congress Interested

And the output of the system has been of interest to Congress, according to Letow. She recalled that one day when the 370/155 she was using was down "every-one was in a panic because the delay was 'holding up a plane to Washington.' It was true," she smiled. "One of the committees in the House or the Senate was waiting for the reports we were supposed to be turning in."

Letow also has a couple of assistants who can code simple reports with the Informatics software. Letow said she has done most of the capital budget coding herself. "I guess I'm the city's Mark IV expert," she said.

She's using Mark IV/260 Release 5.0 — a fairly recent release — and many of the special features that are available with it. She said she has Table Lookup, Indexed Core File support, Extended File Processing and Extended Transaction Processing.

But the feature she obviously likes best is Extended Segment Processing, which allows direct comparisons and matchings between segments within the files being managed. ESP is the feature's acronym "and that happens to be sort of appropriate for us at this point, doesn't it?"

There are a number of good report-generator systems now available, she volunteered, but Mark IV has a really good file maintenance system in front of it "which doesn't hurt anything at all." Thinking aloud, she said, "I don't know who the

mad man was who first thought up this word system, but it's a good one."

It's grown over the years and the vendor's support has always kept pace, she said.

## Honeywell Policies Seen Hurting Sales; Users 'Extremely Unhappy'

(Continued from Page 1)

Mike Phillips, senior systems programmer at Blue Cross/Blue Shield of Delaware, said his management is "not too upset with the policy because it thinks [the policy] is going to be changed." "But some of our local users have been affected," he noted. "For example, one company that bought a system a few years ago from Honeywell for \$950,000 wants to switch vendor and the best offer it has had for the system is \$500,000."

John I. Dosky, vice-president for The Computer Place, a Cleveland-based used equipment dealer, agreed with Phillips. Sales for a full system have gone down because of the uncertainty of the software licensing charge and the problem with guaranteed maintenance, he said.

Transfer May Cost More

Transfer of a system may incur some additional costs as the policy is defined now, he said. "Receiving districts are very careful in accepting equipment for maintenance — there seems to be a judgmental situation when it comes to evaluating a system, and they do it differently from district to district."

Wilson Grabbil, who is with Dugan

The computer also keeps a cumulative total of the number of patriots, loyalists and undecideds. This information is updated and displayed every 40 seconds.

"Electronic History Book"

Another feature provided by the minicomputer is an "Electronic History Book" available to visitors as they enter the exhibit. By typing page numbers at a computer terminal, visitors can read video-displayed information about some 70 leading figures of Revolutionary times.

Designed by Dr. Joseph J. Eacus, a staff scientist at Honeywell's computer operations here, the system is built around a 16K Honeywell Model 715 minicomputer. Two disk drives are attached to the processor, and 13 Model 775 VIP display stations are available for use by visitors.

Sponsored by Sun Oil Corp., the exhibit is entitled "The Revolution: How It All Began." Located on the second floor of the newly renovated Quincy Market Building, off the corner of the city's downtown section of the city, it will run through early 1977.

and Meyers Construction Co., a Cincinnati company, called the Honeywell Policy "unbelievable."

"This is some of the most strongest stuff I've seen in business since Patterson [former president of NCR] sent his troops out to destroy his competitors' adding machines," he said.

"It isn't just a colossal blunder — the damage Honeywell is doing to its reputation is unbelievable, but worse still, nobody seems to have the guts to go back and say they were wrong," Grabbil said.

Won't 'Stick' in Court

Most agreed Honeywell won't be able to "make it stick" in court.

Grabbil pointed out "there is no definition as to whether a program or a piece of software is a writing." If it is — and it can be copyrighted — Honeywell has not taken the proper steps to protect that software because prior to July it was given away "as a common practice," he said.

"If you want a copy of the latest revision, Honeywell systems engineers would give you a disk pack with the software on it. You can't do that with a copyright," he said.

"If you're going to charge a license fee, you must take all reasonable steps to protect that copyright," and Honeywell did not do that. That software is in the public domain," Grabbil said.

The National users group intends to "fight" the policy and has organized a special interest group to study what it can do from a legal standpoint to force a change, according to White.

This users group clarified the policy — "It wasn't clear what Honeywell really intended to do or what the costs actually would be until then. Now we understand it," he said.

"Next March at our Denver meeting we plan to present Honeywell with our opinion and try to demand a change. If interest is strong enough in the group, we might consider a class action against it," he said.

However, "a lawsuit of this kind could cost a quarter of a million dollars, and that's a real strong point in Honeywell's favor. If it's expensive enough to fight it, Honeywell can get away with it in spite of everything," White said.

## Court Charges L.A. Executive With Theft of T/S Firm's Time

(Continued from Page 1)

used passwords to gain access to the English and French branches to access their systems, according to a spokesman for District Attorney John K. Van de Kamp. Investigation revealed the passwords were used in calls to the computer from Los Angeles telephones from June through October.

Evidence allegedly linking Maki to the crime was obtained when police investigators obtained a warrant to search Maki's home and office.

"One of the things Maki was doing was using the MDSI computer to produce a punched tape that was used to run W&R Tool's manufacturing machines," an investigator claimed.

In addition, Maki allegedly used the MDSI system to access the tool company's accounts receivable.

Maki is alleged to have used the system for 143 unauthorized hours which, had he been billed, would have cost \$15,000, the district attorney's spokesman said.

"Computer crime is presenting a prodigious challenge to law enforcement and imaginative approaches are required to deal with the problem," according to Van de Kamp.

As a result, several staff members of the district attorney's major fraud section are taking a crash course on computer technology.

The W&R Tool and Manufacturing Co. has not been named in the case.

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Datapro as reported in Computerworld, p.14, Jan. 22

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Stu Fletcher, Programming Manager, Cal-Farm Insurance Company.

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by Glenn ImObersteg

## Broader Mutual Backup Aid Suggested

By a CW Staff Writer

NEW YORK — The "standard" plan of computer users for backup processing facilities may not always be feasible for any of several reasons, and a "more broad mutual-aid arrangement" was suggested to attendees of the recent Computer Security Institute (CSI) conference here.

Belden Menkus, an independent consultant and member of the institute's advisory board, outlined reasons for possible failure.

Equipment configuration may not be totally compatible, Menkus said. Sufficient processing time may not be available at the alternate site, he also noted.

Finally, there is the problem of the common disaster such as the floods which have been experienced in the East in the past three years, tornadoes, or the fire last February at a telephone company switching center, which affected some 140,000 phones.

Menkus, who is also editor of Computer Security, the newsletter of CSI, thus proposed a broader mutual-aid arrangement for users to consider.

While details of such arrangements will be covered in the next issue of the newsletter, the points are summarized as follows:

- Participants agree to aid each other during and after a disaster, with the applications being split among several sites, not just one backup.

- With the workload allocated to several "unsaturated participants," the participants absorb the processing costs as an investment in their own future backup.

- A coordinating committee sets security standards and conducts disaster-recovery simulations.

- Sensitive or proprietary data may be processed at a closely controlled commercial service organization, thus getting around any problems or conflicts of cooperation with the competition.

- Participants may be geographically remote, solving the problem of the common disaster.

Information on the newsletter and CSI programs is available from the institute at 43 Boston Post Road, Northboro, Mass., 01532.

## No Perfect Answer Seen Existing To Problem of Fraud Prevention

(Continued From Page 1)

were, programs and data files and are chosen from normal access control procedures.

He also advised attendees to notice changes in personnel behavior, especially at the management level or in people who have access to assets, records, etc.

Krauss recalled the suicide of a financial systems manager shortly after an audit was announced. While the case is still under investigation, and there are no conclusions as to the manager's complicity in any fraud, Krauss said the manager did exhibit noticeable behavior changes months before the impending audit was announced.

swindle." Krauss reported a case in which a programmer "sliced off" rather than rounded off fractions in shares bought in an employee investment plan and transferred the fractions to his own account. When caught, the programmer had already credited his account with some \$380,000 worth of securities, Krauss reported.

### 'Sleuthing the System'

There are several things to look for in "sleuthing the system" against would-be perpetrators of fraud, and Krauss used the Equity Funding case as an example of such items.

The first item to look for is too many tapes being stored in the library; these tapes may have the perpetrator's version of the master file. As a countermeasure, Krauss said regular listings and audits need to be made of the inventory list itself, as well as the tapes.

Another sampling needs to be made of header labels, to make sure the tape contains the same data or records as indicated on the external label.

A regular examination of the library log should be made, he continued. For example, check the date of creation on a certain tape against its first logged entry into (or withdrawal from) the library.

If there is no log entry around the date of creation, then the tape may have been added to the library surreptitiously.

A regular and surprise verification of all the above information in the backup tape library should also be made, he noted.

Another item was referred to as "Mickey Mouse" update programs. In the case of Equity Funding, there was a tape called "Phoney of the Master File," Krauss said, adding normally the fraudulent tapes "are not so obvious."

As in other technical problem areas, the solutions lie both in technology and in procedures used to control people, Krauss said. Thus, there are several methods which can be used to help close the loopholes, he noted.

Some of these loopholes exist by design, i.e., they may be too expensive to close, and others simply by oversight, he noted.

The first thing to change is overlapping duties of people in responsible positions, Krauss noted. For example, in a case in which a computer operator was able to forge checks (payable to friends rather than to authorized vendors) and then destroy them when they were returned to the company, the person preparing the check should not be involved in its reconciliation.

## CW at CSI

But, rather than watching specific people, it is the "functions" which must be monitored closely, he said. For example, audits should be made of control procedures over payouts and receipts, among other areas.

Krauss suggested watching for the following:

- Operating interventions, such as abnormal interrupts which could permit a person to enter "private data" or to override and ignore error-control procedures.

- Irregular master file updates, which he compared to "keeping a second set of books." This process can be used to change the status of a file, such as increasing a person's credit limit or hiding the status of delinquent accounts.

- Programmed traps in applications or systems programs. These interface with normal operation. They can be used to forge instructions to an operating system and make "bogus changes."

- Programmed "magic code" which is similar to trap, except no evidence is left except during the actual fraudulent processing. The stories of hidden code which in effect "creates itself" and then disappears are valid, Krauss indicated.

- Input capture and alteration, which is typically accomplished by people with access to documents where controls are sloppy.

- Output capture and alteration by people with access to output reports. These people can alter exception reports, especially on terminal displays, he noted. Finally, there is the instance security consultants have come to call the "salami

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## 'Who's Looking?' First Query

# Security-Conscious Users Told Three Questions Vital

By Edward J. Bride  
of the CW Staff

**NEW YORK** — Who is looking for fraud in DP centers? How do they analyze the various risks? And what countermeasures are available to protect the DP center?

If one had to sum up the main issues facing computer users today in the realm of security, these three questions should be asked, according to three speakers at the second annual conference of the Computer Security Institute held here recently.

As to who is looking for fraud, users might be tempted to answer "the auditors," but one speaker threw water on that theory.

Joe Wasserman, president of Computer Audit Systems, described the Systems Accountability Control (SAC) Project funded by IBM and the Institute of Internal Auditors.

The SAC project consists of surveys and interviews to determine the state of the art of computer auditing and control. Wasserman explained. Other goals include setting the proper perspective on auditing/control within the systems environment and increasing management awareness of the need for controls.

Wasserman, a member of the 46-person SAC advisory committee, predicted that, when the report is complete next summer, "we won't find much activity" by auditors looking for fraud.

An audience member later commented that, since fraud is difficult to detect, it is the last priority for auditors, who look for errors, omissions, and ac-

counting consistency.

Wasserman agreed "detection is extremely difficult," but noted it is being done by "a finite number of companies."

More and more auditors are checking security and disaster

## CW At CSI

plans, as well as policy on records retention, he said.

Management awareness of the need for controls is an area in which many companies are weak. Wasserman continued, adding the weakness of management awareness is true of "any computer security function."

### Risk Analysis

The beginning of any risk analysis project is to study the threats and the possible losses to an organization, and Robert V. Jacobson presented some methods of categorizing these areas.

Jacobson, conference chairman and an assistant vice-president at Chemical Bank in New York, indicated there are three potential loss categories: degraded productivity, DP assets and other organizational assets.

There are 10 categories of assets, many of which can be tampered with through the computer: cash and negotiables; goods and materials; services; receivables; proprietary information; machinery and equipment; buildings and grounds; confidential information; business records; and trained personnel.

Among the threat categories

are acts of nature (which are "indifferent" to the existence of the DP facility), sabotage, theft and internal break-downs, Jacobson continued.

Using these categories or further subcategories, users should determine the precise threats and possible losses in order to set their own priorities for protection, he said.

DP manager and senior management must then "think about the problem in a disciplined, structured way, which will provide a 'common basis for discussion' that users can focus on."

Brutal losses can be ignored so management can focus its attention on the serious exposures, he asserted. And the selection of countermeasures can be balanced against the reduction of expected losses.

### Security Countermeasures

As for countermeasures, control procedures are really what help prevent incursion into a computer system, according to Peter S. Browne, manager of the security operation at General Electric Information Services' Business Division.

These countermeasures are found in containment of threats, deterrence, obfuscation of the assets and recovery from problems, Browne said.

For example, one might isolate an asset to reduce the probability of theft or manipulation; this can be accomplished by controlling access to the "target" or plugging "holes in defenses" (opening systems), Browne noted.

The protective strategy against the very motives of perpetrators is to advertise punishment of previous offenders and/or increase the chances of being caught, Browne said.

Punishing offenders presents a problem in itself because many organizations refuse to prosecute embezzlers, whether their crimes are manual or computer-aided, according to Browne and most other speakers on the program.

Reviewing audit trails will also detect frauds early, thereby reducing losses and presenting a

deterrent to would-be thieves, Browne said.

Obfuscation or concealment of assets is accomplished through cryptography, which reduces the probability of incursion; tighter control over proprietary information also reduces this probability, he noted.

Additionally, the dispersion of assets, facilitated by advances in data communications, reduces any losses should incursion occur, he continued. Alternative processing and multiple-location processing are the items to be considered here, Browne said.

As for recovery from a ca-

tastrophe, users need to look to other sites or resources and should always have contingency plans, he said.

The cost of these and other measures need to be determined according to any products that might be involved (audit software packages, hardware, etc.), plus site preparation, supervision, test and acceptance and monitoring.

Weighing these one-time costs plus operating costs against possible losses is the only way to ascertain the cost-effectiveness of countermeasures, Browne concluded.

## DPers Possibly Facing Insurance Crisis Soon

By a CW Staff Writer

**NEW YORK** — Computer users may be facing the same type of insurance crisis as doctors and others concerned with malpractice because protection from errors and omissions may no longer be available in two or three years.

This is of special concern to DP service bureaus and users of in-house systems who do work for others, according to Guy Migliacelo, vice-president of Marsh and McLennan, Inc., insurance brokers.

"If you do service work for others," he cautioned, "you may be liable for errors." Even if a user is leasing equipment directly from a manufacturer, "don't think you're necessarily covered by the manufacturer's insurance," he warned.

Addressing about 125 attendees at the second annual conference of the Computer Security Institute (CSI) here recently, Migliacelo said that, with the possible disappearance of error/omission insurance, users need "more clarification" with their customers on the responsibilities involved in processing information.

If the user is willing to cover the first \$100,000 of damages, he noted, then an insurance company might be "more willing

to protect you."

"Neither the leasing nor the insurance industry has even recognized the special problem" of data processing liability, let alone solved them, he said.

Liability for errors and omissions is the most troublesome for which to attain coverage, he continued, adding "even Lloyds of London is backing away" from this type of protection.

"By the end of next year, only two or three companies will be offering" this coverage, he predicted.

DP insurance is expensive, Migliacelo noted, because the equipment itself is expensive and often concentrated in one place. Additionally, the gear is often difficult to replace, which makes insurance for "business interruption" expensive.

Data itself is concentrated, and physical damage may come in many forms: the media, equipment, lost processing time, etc., he noted.

In buying insurance, the user can save money by scrutinizing the policy to eliminate redundant coverage, he advised. For example, if the policy on a building covers fire or floods and that policy also covers equipment in the building, then specific coverage on the DP equipment may not be needed.

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# Israeli Teacher Strikes Have Genesis in System Switch

By Alex Regen

**JERUSALEM, Israel**—For the third time this year, The Israel Teachers Association is threatening to strike over the Education Ministry's failure to pay back salaries dating to 1973.

What makes this labor dispute unusual is the fact that the employer is more than willing to pay the money, as well as interest and cost-of-living increments, but is unable to do so because of problems with the computer programs which are supposed to calculate exactly how much is coming to each teacher.

The story began in 1973 when the ministry ordered its IBM 360/40 and began looking for something bigger. The government's Steering Committee on Data Processing, anxious to break IBM's dominance in the government sector, decided to bring in a non-IBM computer and, after a long series of proposals and counterproposals, the ministry ordered a Burroughs B4700.

The staff at the ministry was almost unanimously opposed to the Burroughs computer—it wanted an IBM 370 in order to minimize conversion problems—and, when the computer arrived in late 1974, some 80% of the staff resigned, most taking jobs at other government-owned IBM installations here.

The effect on the most critical of the ministry's systems—payroll—was disastrous. Many of the programmers who left were openly hostile to the staff of Burroughs' local agent, Tamkin Ltd., and

## List Discovery Starts Dispute on Marriage

**JERUSALEM, Israel**—A computer system used by the Israeli government to uphold a 2,000-year-old marriage law has been caught in the middle of conservative and liberal politicians' arguments.

The Israeli Ministry of Religious Affairs used the system to maintain and update a list of persons who by Orthodox Jewish law might not be permitted to marry.

Religious officials maintain the list is necessary to block bigamous weddings and other illegal marriages as specified in the Talmudic law code.

Discovery of the list has sparked controversy over the absence of civil marriage in Israel.

The computerized list was unearthed recently by Shulamit Aloni, a member of the Knesset, or parliament, who criticized the list at a technique not unlike those used by the Spanish Inquisition 400 years ago to persecute Jews.

Religious officials claim the list is merely a record of those persons who have gone before the rabbinical courts, which determine wedding eligibility under Jewish law.

Even when a person's qualifications of marriage suitability have been questioned by a rabbinical court, ministry officials added, the person can appeal to a higher court and be removed from the list.

Since there are no civil marriages, in Israel, however, liberals in the Israeli government have labeled the existence of the list "McCarthyism" and insisted the list be abolished.

essential documentation and files sometimes "disappeared."

The ministry's new staff was unable to get the payroll out in January, and teachers were given advances against a salary to be calculated sometime in the future.

### Teachers Walk Out

In February the teachers walked out for one day, charging that many of them hadn't gotten any advance at all and that no progress was being made on the issue of back pay. In fact, the calculation of back pay had been neglected in the rush to get the current work done.

Only the personal intervention of the minister of education and his promise that everything would be straightened out by the end of the school year prevented the strike from going beyond the first day. But the teachers struck again in September and are now threatening another strike, since their demands have

still not been met.

Moreover, there are teachers who have been getting advances instead of salaries for more than a year, and each month others vanish from the master file. By this time, assurances by cabinet ministers have lost their value in light of the Education Ministry's continuing inability to get the salaries out, some teachers feel.

During the February strike, articles in the Israeli press implied the problems began when the IBM computer was replaced by the non-IBM computer. In reality, the picture is much more complex.

Even in the IBM days, the ministry had great difficulties getting the payroll out on time. Although it is not widely known, one of the reasons the Steering Committee on Data Processing insisted on switching from IBM was its desire to force the ministry to convert the system in hopes the rewrite would be an improvement.

One by-product of the incident has been the enhancement of IBM's prestige in Israel. IBM has more than two-thirds of the local market and is doing very well—the foundation for IBM's skyscraper headquarters was laid last month in Tel Aviv.

At Tamkin, on the other hand, sales have nearly ground to a halt. In fact, two companies in the last four months have returned computers to Tamkin and ordered IBM computers in their place. In both cases, the firms are using Tamkin over its alleged failure to get the hardware and software working as promised.

At this point no one knows what will become of the teachers' back pay but, as someone at last month's trade conference in Jerusalem said, "Everyone in Israel has at least five friends who are teachers, and they and all the schoolchildren know the only good computers are IBM computers."

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## Editorials

### A Political Vendetta

The New Hampshire Centralized Data Processing (CDP) agency has lost another skilled professional. Arthur Hill has found it necessary to leave the post of CDP director because of increasing attempts by state politicians to insert themselves into his day-to-day operations (CW, Nov. 26).

It is to be expected that any central DP organization will draw resentment from other agencies if it loses control over its own accounting and other functions. But this has not been the problem in New Hampshire. The CDP staff has tried to enhance the state operations, not alter them.

Governor Meldrim Thomson has converted an inbred ignorance and distrust of computers into a political vendetta against the CDP agency. In truth, the efforts of Hill and his staff have saved state agencies countless thousands of dollars in more efficient DP operations. Yet Thomson claimed millions of dollars have been wasted.

Unless a central DP organization in a state or business gets full support for its activities from the chief executive, it operates with a serious handicap. In New Hampshire, there is an additional problem in that Thomson and his aides have complained about CDP waste and have bird-dogged the agency to substantiate their charges.

It is doubtful whether the present state administration will allow CDP to operate as an autonomous agency, no matter who succeeds Hill. What is needed is a new outlook from the top and a governor who will take pride in the accomplishments of a centralized CDP agency instead of fearing it.

### Wait and See

At this time it is important to warn readers following the progress of the U.S. government's antitrust case against IBM.

To date there has been a great deal of publicity about the case in *Computerworld* and in other publications. This will continue and perhaps intensify in the next few months.

But so far — and here is the warning — only one side of the case is being presented in the courtroom. That is the government's case against IBM.

So the record of the case covers only the charges that are being made by the government. The government will continue presenting its side of the case for about six more months.

After that, IBM will have its chance to defend itself from the charges — an action that could take a year, if not more.

When reading articles on the case, this should be kept in mind, and readers should not form opinions before all the evidence from both sides is in.

What may seem uncomplimentary or damning at this stage may be refuted by testimony later for the defense.

The trial will certainly be long and involved, but, in fairness, everyone should wait for all the evidence before forming opinions about guilt or innocence in the matter.



## Letters to the Editor

### Time for Computerworld to Correct

#### Letters in Front-Page Masthead

I enjoy reading *Computerworld* and think it is the best weekly DP publication. However, I think it is time the front-page masthead is corrected. I believe the first "O" in the word "Computerworld" is "zero" and the second one is correct. This makes it an "unidentified" word.

Nathan Mark

Elizabeth, N.J.

You're right! And believe it or not, no one here has noticed it in seven years, even though it is now immediately apparent to us. We'll see if the change is noticed when it occurs, but won't say when that will be. Ed.

### Unimpressed With Overly Impressed

I have read with much interest the exchange of letters concerning NCR that was originally triggered by Ed Tunstall's comments on the subject (CW, Oct. 15).

To begin with, I am not impressed with anyone who is overly impressed with any computer hardware company. Don Masterson's letter (CW, Nov. 19) was a classic example of someone being firmly in the hip pocket of a hardware company. Masterson has migrated so far with NCR he may just follow them to their grave — or at least get lost in the cemetery.

The reliability of hardware and the quality of hardware service has not generally been one of NCR's major problems. The configuring of hardware has been a problem.

More importantly, NCR historically has not understood the problems of a diversified high-development computer applications environment. An "unpacked" NCR user will find the going rough, unless things have changed drastically under President William S. Anderson's leadership.

The advice of Masterson to Ed Tunstall to "polish up his resume" is rather typical of the technique that has been used on many DP managers through the years. Hardware companies tell user top management they don't understand why it is having trouble getting results when all of their other users are perfectly happy. Top management in turn tells the DP manager to make the system work or else.

David L. McConigle

Grand Rapids, Mich.

### Why Won't Honeywell Stock Parts?

In the article on Honeywell (CW, Nov. 19), Richard R. Douglas of Honeywell is quoted as saying "Why should we be expected to deplete our field inventory to service noncontract users at the expense of our contract customers?"

I would hope most Honeywell customers would not expect such action on Honeywell's part, but that inappropriate question simply misdirects the

reader's attention from the real question: Why won't Honeywell stock parts to support the installed base?

The flow of parts that must come from Honeywell will not change significantly whether a user is under contract or not, and there is probably no user concern about those parts that are readily available from alternative sources.

Honeywell should know the difference. The predictions of parts requirements are better as the base increases. Therefore, the local group should be able to predict its parts requirements more accurately for the entire installed base than for only the contractual maintenance base.

It is difficult to believe the various field offices are forced to order all their parts with 39 to 52 weeks of lead time.

If true, it is a terrible indication of the way Honeywell does business. Regardless, it should not be used as an excuse for equally shabby treatment of customers.

Keeping track of parts requirements and assuring adequate stock is one of the functions for which computers seem to be made. I was even under the impression that Honeywell sold computer systems that performed this valuable function.

I hope anyone considering purchasing a Honeywell system took note of the statements by Douglas and acts appropriately.

L.A. Benton

Del Mar, Calif.

### Error Found in Check-Digit Method

In The Taylor Report on Oct. 22, Alan Taylor described the Deeds check-digit scheme. There is an error in the method Taylor used to obtain the check digits. Fortunately, the procedure he used to obtain the check digit for 4321 happened to work for that number. If he used the same method to obtain the check-digit for 789 he would not have obtained a 2.

This is typical of what happens when someone waves his hands at the "esoterics." Great care must be taken when using the tables (Figure 1 and Figure 2 in the Oct. 22 Taylor Report).

Figure 2 is derived from a group multiplication table in such a way as to completely eliminate commutativity (For the nonmathematician, that's interchanging digits). But in so doing, the table is no longer associative.

Generally there are four easy ways to carry out Deeds' method. Perhaps the easiest process would be to place the check digit on the left, say X4321. Now, to find X, use Figure 1 to change 4321 to 1391. Now, applying the table of Figure 2, reduce 1391 to 139 to 12 to 1. Then determine X so that X1 is a 0 in Figure 2. That is, X is 1.

Using this process to obtain the check digit guarantees it works because the scheme to obtain the check digit is the same as the scheme to verify the number with the check digit.

John Beldier

Scranton, Pa.

## Letters to the Editor

### 7090, -94 Users Get Services, Information

I would like to thank Computerworld for printing the announcement of our attempt to form a users group for IBM 7090, -94 systems (CW, Oct. 1). It has so far brought a good response.

Our reason for attempting to form such a group is that first of all, these systems are comparable to 360/50s in performance and are available to educational institutions through the state surplus agencies for \$100 or so plus any shipping costs.

Also, sometimes a local industry will be willing to donate one of these older systems. Secondly, these systems are surprisingly reliable. Our experience has been that, once the mainframe has a chance to settle in, it will go for some months between failures.

Thirdly, when the electronics do fail, they can be easily repaired, and the parts are cheap. At the moment we can provide technical services and information such as lists of suggested replacement transistor, on-site assistance and machine setup assistance and interfacing to the data channel.

We can also at the moment provide either 7090 lbs or 7094 lbs and the sources for the system programs except the 9PAC and the old Commercial Translator. We also have the source for Pufft and the Pufft library.

We would like to expand the amount of software available and include other operating systems such as SOS and MAD and would like to find copies of Snobol3, Pilot (a systems lan-

guage) and Lisp.

We are trying to locate as much existing software as possible because, since Shure and IBM have both deleted their 7090 series programs, there is no source left for many of them but ex-users.

We would like, if our group gets off the ground, to form some sort of central library for these older programs.

Terry M. Harris  
Terre Haute, Ind.

### Avoid Machine Code

Roger Poole asks for reader response on the subject of debugging Cobol programs from core dumps (CW, Nov. 12) D.W. Barron said it perfectly in the March issue of *Computer Bulletin*. "Brown and Simpson remark that humans who gain their livelihood by scouring rubbish tips are not highly regarded by society and suggest that we should regard programmers who grub around in hex dumps in a similar light. Whilst programmers are prepared to be scavengers and are unwilling to develop tools even of a sophistication comparable with a bronze-age axe to help their debugging, do they deserve to be called professional?"

I can only feel that anyone who thinks it is right and natural to go to a machine-code level in a core dump, to debug programs written in a higher-level language (yes, friends, even Cobol is a higher level language) must be either woefully naive or a terribly poor programmer. Core-dump debugging subverts the entire purpose of Cobol (or any other language above Assembly level).

Yours with some irritation,  
Laurance F. Wygant  
Chicago, Ill.

*There is a tide in the affairs of men,  
Which, taken at the flood, leads on to fortune;  
Omitted, all the voyage of their life  
Is bound in shallows and in miseries.*

The hard is full of good stuff for computer people, including the colloquy between the two terminal operators: "I can call systems from the vasty deep," says the novice. "Why, so can I, or so can any man," says the veteran. "But will they come?"

Indeed, it is flood tide in the world of minis and micros; acceptance is high; the peculiar economics of the times is favorable; excitement is peaking. If we do the right things, fortune—financial and professional—lies ahead. But if we steer wrong, the poet's "shallows and miseries" can ground us. The great temptation as the mini revolution matured has been to go the way of the big machines: large word size, complex instruction set, many types of peripherals, a fancy operating system, "maximum" languages such as PL/I. We hear almost daily of minisystems, or to be more realistic, systems made by minimanufacturers, costing \$300 thousand or more.

Now we have a second chance, and almost certainly the last: microcomputers. The processor-on-a-chip boys have come along just as DEC and the other early comers stampeded off in the direction of the IBM coral, where they almost certainly will be stamped flat. The users can again insist on simplicity and moderation—on straightforward tools for straightforward tasks.

But microcustomers are usually novice users. Their excitement and enthusiasm, played on by the salesman—himself often also a novice, unaware of the ancient agencies of the big-CPU trade—may be punished by a swollen and unbalanced hardware and software package, often requiring as much sophistication in application as a 370.

I sympathize with the manufacturers and their salesmen. Certainly, fancy new hardware capabilities are the most appealing tools with which to increase sales and to enter new applications areas, far more appealing than lower prices on difficult problem-oriented program packages. If sales lag, offer floppy disks, or quadruple the main memory. But I want the user community to resist these seductive standards only the simple systems, the small capabilities, the moderate memory. Accept machine language—elementary, few-instruction machine language—coding. Don't pay for megaCobols or PL/I; a good assembler is enough.

It's the last time around, at least for the basic von Neumann pipeline-memory computer. If the user community allows microprocessor systems, like their big and mini predecessors, to get all tilted up with software, we'll end up with million-byte operating systems in our digital wildernesses. We are lifted on a magnificent flood of new technology; let's stay afloat, and not be grounded in the supersoftware shallows!

*Heck Ground*

### Interest in Certification Rises

## CPDs Could Challenge CPAs on DP Standards Audits

Another interesting item that came out recently during the data base conference held by the National Bureau of Standards (NBS) and the Association for Computing Machinery was the central position that almost all groups gave to "standards." Of the five groups, four backed standards as being necessary, inevitable, etc. The fifth, Advanced Technology Publications, Inc., was deadlocked on the issue and made no pronouncement in either direction.

But talking about standards without talking about who was to prepare them or to enforce them is like talking in a vacuum.

In the auditing group this subject came up specifically. Speaking for the auditing group, the American Institute of Certified Public Accountants' (AICPA) Donald Adams said it appeared inevitable that the auditors would have to take this step. Adams also explained how why such a role had been rejected in the past by the auditing profession and why they had changed their attitude.

In the time he had available, he cer-

tainly wasn't able to provide a full discussion, but he listed that, among the reasons for prior rejection of such a role, was the possibility of malpractice suits. The reasons for the auditors now taking the role were, he said, that they were forced upon them and that the profession was agreeing "kicking, screaming and counting their fees."

#### 20,000 Would-Be CPDs

A few days after the conference, however, another happening came about which perhaps reopened the question as to just what role the auditors are to play in data base and other computer standards.

The Institute for the Certification of Computer Professionals (ICCP) announced that over 20,000 applications had already been received from people wanting to take the 1976 Certificate in Data Processing (CDP) examination. This was double the number who took the examination last year, ICCP said.

This is more than just a numerical jump. It provides clear evidence that the purpose of setting up the ICCP a few years ago is being achieved. Certification of computer personnel on technical basis is coming and coming with broad backing from the various technical societies.

This makes the auditors' assumption that there is a continued vacuum which is

forcing them into the position of computer system standards enforcer no longer valid.

With the tremendous support the CDP is now getting from the profession, the standards could be set and enforced by a CDP-based organization. I am not saying it will be—but I am saying that the vacuum no longer exists.

#### Who Will Serve Best?

What have we to do then is to look at the task of enforcing standards in the computer field to see whether such a task really fits the traditional mold of auditor operations.

Use of the auditors is attractive because of the great service they have already given to commerce and because of the hope that they could give equally great service to computer developments.

#### Malpractice Issue

Personally, I don't see the auditors really being able to provide service successfully in their traditional way and in computer areas.

The clue, as I see it, came in Adam's mention of malpractice. Malpractice in the fast-developing areas like DP is most unlikely to be defined in the same way as it is in the centuries-old accounting profession.

Malpractice in accounting is essentially a

failure to handle things in accordance with normally accepted standards. The invention of some new, better way of accounting for some item does not make it wrong to continue to use earlier methods.

But in technically advancing areas such as engineering or medicine, for instance, the discovery that an available method some accepted way of doing things does make it a matter of professional malpractice to continue working in the old way.

An engineer is always expected to use the latest available information in his profession; the accountant is not. And that difference is crucial.

As I see it, the standards that are coming with regard to privacy, security and other items will require DPs to work like engineers, using the latest available information to secure conformity with standards as we go about our work.

Technical progress will have to come into use just as soon as it is known. And that implies a limited role, at least, for a technical authority such as one based upon certified computer professionals, rather than an exclusively auditor-controlled situation.

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**The Taylor Report**  
By  
Alan Taylor, CDP



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# Systems Houses, Clients in No-Man's Land

By Roy N. Freed

**Special to Computerworld**  
Systems houses that buy computers in the OEM market and resell them with applications software, and their customers, are coming to realize they are in a legal no-man's land in regard to protection against patent infringement and product liability.

This situation has come about because hardware manufacturers supplying the OEM market have failed to take the reasonable and necessary step of simply trying to picture themselves standing in the shoes of their immediate customers and the ultimate users of their hardware. By that default, they have adopted business positions reflected in their "standard" agreement forms that are unrealistic and untenable.

This state of affairs was dramatized for me recently when I undertook to handle negotia-

tions for an end user directly with the hardware supplier and when I drafted a set of terms and conditions for a systems

making, selling and using the invention covered by it. The systems house is a seller; its customer is a user. They both have

## From a Legal Viewpoint

house. It was interesting to me to see how the two transactions dovetailed to bring to light the common legal problems requiring attention by the hardware manufacturer.

Let me explain the nature of the underlying legal considerations.

### Patent Infringement

Every maker, seller and user of a product always runs the risk of infringing someone's patent by virtue of that activity. The rule is that the owner of a patent may prevent all others from

exposure.

Furthermore, Article 2 of the Uniform Commercial Code, which applies in all states except Louisiana, provides that sellers of goods implicitly warrant they are free from infringement. Hence, a systems house that doesn't disavow that warranty in writing effectively makes it and could be held liable for damages if its customer were sued for infringement.

Moreover, most, if not all, hardware manufacturers share the common provision in their terms and conditions that they will defend their customers, the systems houses, against infringement charges. But they also insist upon the right to recall the infringing items if they are concerned about exposure, on the condition they refund the undepreciated portion of the price paid to them.

Note the situation of the system house. If the hardware manufacturer demands a competent or complete item back, the systems house literally is under a legal obligation to retrieve it from the user. Can a systems house really assume that exposure?

Is this an entirely academic matter? Although infringement situations don't occur often, they always are possible. Contracting parties that try to do a careful job of providing for worst-case situations cannot ignore that possibility. Were contracting parties should anticipate it and provide for its handling in a fair manner.

It might turn out, upon careful analysis, that the systems house is an innocent element in the normal channels of distribution and should be relieved of involvement so far as infringement by the mere use by the user is concerned. In that case, the hardware manufacturer should set up a direct relationship covering the infringement aspect between itself and all its end users. This would naturally be limited to the equipment and operating system software it furnishes and in the condition in which it furnishes them.

This seems to call for a bit of

legal statemanship and innovation. Of course, the systems house always runs the risk of being an infringer by its act of reselling the equipment and must protect its own exposure in that regard, probably by an indemnification commitment from the manufacturer.

### Product Liability

The same analytical exercise applies to the matter of product liability. Every maker and seller of goods is exposed to legal claims when the goods are defective from users and third persons who suffer harm from them.

The trend is for courts to hold suppliers of goods liable "without fault," which means regardless of the fact they were not negligent in permitting defects to exist in the goods. Although systems houses frequently only resell the hardware they handle, they normally function as systems houses, and as such, they could themselves have significant legal exposure in this respect.

Should systems houses have to buy products liability insurance on the hardware they buy and resell? What is the proper responsibility of the hardware manufacturer in that regard? These are important, entirely realistic questions.

### Identified Relationships

The systems house can exclude its infringement liability respecting the resold hardware by a provision in its contract with the end user. That is feasible because only its customer is exposed to harm from an infringement occurrence.

However, no such easy tactic is available respecting product liability because the exposure runs to people who are not in a contractual relationship with the systems house, such as employees, visitors and neighbors of its customers.

These two examples show the need for in-depth legal examinations of the identified relationships between hardware manufacturers and systems houses and end users, as well as the possibly significant but thus far unidentified relationship between hardware manufacturers and end users who are customers of systems houses. Skilful attention to the considerations involved will forestall fractions that always are in store. The exercise represents a typical example of preventive law.

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## Concept Applicable Anywhere

# Cooperative Effort Builds Ongoing Education Plan

By Don Levitt  
of the staff

WELLESLEY, Mass. — More than a dozen major DP installations, a college devoted to management training and a personnel-oriented consulting firm are working together on a professional development program of courses for experienced DP staffers in the installations.

The EDP Education Program (Edpep) was conceived two and a half years ago in conversations between Babson College and QED Information Sciences, Inc. Babson has been involved in continuing education programs for management-level people for many years.

QED has been working with various clients helping them define in detail just what it is their DP departments are supposed to be doing, what needs are needed

to accomplish those deeds and what training personnel need both to reach those skill levels and to advance their careers.

Training has often been a stepchild in a DP budget — underfunded, understaffed and usually one of the early casualties if there is a financial crunch. Even when there is management support, it is difficult to implement an effective program in-house or to find an ongoing, organized program outside, the planners recognized.

### Core Curriculum

Edpep is built around a core curriculum of courses given repetitively at the Babson campus here by outside lecturers supported by college personnel and open to "member" companies.

This provides an ongoing base of funds so Edpep can avoid the cost of public

seminars many DP shops find difficult to justify, QED noted.

Satellite courses on specialized topics that may not be suitable additions to the

## Peopleware

core curriculum but are deemed useful are open to Edpep members and to organizations outside the program.

While QED and Babson put together the original idea, they were careful in the first place to take their thoughts to the major users in the area to see if the ideas meshed with what the users thought they needed.

That philosophy of tuning the program to the user continues with monthly meet-

ings of an advisory council made up of two people from each member organization, a senior DP line manager, and the person in charge of the member's own DP training activity.

In its sessions, the council reviews the very detailed course critique forms each student is required to fill out at the end of a course.

Beyond that, the council reviews course content to ensure each course is "on target" in meeting the needs of the members. It also suggests new courses when needs change enough to require an extension of the program.

### Transferable Concept

The concept on which Edpep has been built could certainly be transplanted to other clients, according to both Associate Dean Stuart Stokes of Babson and Ed Kerr of QED.

It has in fact been carried over to the New School of Social Research in New York City and could be developed any place enough DP installations are willing to work together in planning, finding the very best instructors they can and then monitoring the program's progress.

In the Babson-based program, subscribing companies pay a flat fee which entitles them to one seat in each course given during the year; additional seats are available at a somewhat reduced cost. The satellite programs are available to Edpep member companies at a cost less than that charged "outside" firms.

## Features of IDS/II Include a Price Tag

WALTHAM, Mass. — Honeywell Information Systems has updated its classic data base management system (DBMS), Integrated Data Store (IDS). IDS/II includes a number of new facilities and something else that is new to IDS users — a price tag.

The original IDS, developed seven years ago, influenced the work of Codasyl's Data Base Task Group in its attempts to define specifications of a generalized DBMS.

Almost ironically, in its current announcement Honeywell said IDS/II "implements recommendations and specifications established as industry standards" by Codasyl.

The IDS/II release includes a data definition language for schema and sub-schema description. Before the schema is changed, a data dictionary facility added in IDS/II shows those programs affected by the proposed change, Honeywell noted.

Translators for defining data base and media environment and for defining and validating data base subsets as well as runtime data base control routines are included in the IDS update. An integrated control system is said to reduce main memory requirements, ease multiprogramming use of the data base and improve overall performance of the system.

The system was designed to support time-sharing, transaction processing and batch operations, apparently simultaneously. An "interactive IDS/II" option is required for time-sharing use, Honeywell said.

The Unified File Access System developed for I/O support and buffer management on Series 60/Level 66 CPUs is utilized

ized by IDS/II to support multiple concurrent users.

"Improved data security," including "lock" options at the record level or on use of user-specified verbs, is another of the enhancements in IDS/II, according to Honeywell. On-line recovery facilities apparently are also in the latest version.

Industry sources suggest the updated IDS includes "the full Codasyl privacy and security facilities."

A set of utilities to help users in conventional programming environments convert to IDS/II and another set to help current users reformat files to run under either IDS/I or IDS/II are also in the updated software.

The IDS/II DBMS is immediately available in the U.S. for Series 60/Level 66 and Series 6000 EIS systems with Release 2H of Gcos, the Honeywell spokesman said.

The IDS/II DBMS is immediately available in the U.S. for Series 60/Level 66 and Series 6000 EIS systems with Release 2H of Gcos, the Honeywell spokesman said.

DALLAS — Assemblers producing code for various microprocessors and a test bed environment for the output are now on the University Computing Co. (UCC) remote-computing network.

The programming support includes a macro facility.

The simulators can handle the ROM/RAM environment, simulated interruptions and I/O operations and were designed to support debugging of programs for the Intel 4040, 4004, 8080 and 8088 and Fairchild F8 among others, UCC added from 7200 Stemmons Freeway, 75247.

Without noting his words represented a change in policy from the free distribution of the original IDS, he added "monthly charges [for IDS/II] vary with scope and capabilities required."

Basic IDS/II, including the runtime controls, data dictionary, lock procedures and data base administrator support facilities, is available for \$400/mo. An optional interface to Cobol is an additional \$100/mo and the interactive support is another \$75/mo.

## 'Giant' Supports DEC 310 User

LAGUNA HILLS, Calif. — Users of Digital Equipment Corp. Datapoint 310s or 340s can interactively describe new and existing DP requirements through the use of a "no-programming" file management package called Giant from Second

Source.

The user descriptions are posted to control tables by Giant, which then creates a data entry program for Indexed Sequential (Ism) support for accessing records by key, a spokesman said.

On the other end of the DP cycle, report generation modules allow the user to interactively set record selection tests, sort requirements and report formats.

Reformatting of the files, including addition or deletion of fields, is another Giant capability, the spokesman added.

Overall, Giant "promises" to reduce setup time for a new file and its data entry program and reports to as little as one hour instead of the week or two of "normal programming" time, the vendor claimed.

The package is written in DIBOL and runs on any DEC Datapoint 310 or 340 — the PDP-8-based Datapoint systems — with at least 24K bytes of memory.

The software is available for a one-time cost of \$1,000 per site. Second Source can be reached through P.O. Box 2749, 92653.

## Micro Manipulators Mushroom

### •Net Adds Test Bed

DALLAS — Assemblers producing code for various microprocessors and a test bed environment for the output are now on the University Computing Co. (UCC) remote-computing network.

The programming support includes a macro facility.

The simulators can handle the ROM/RAM environment, simulated interruptions and I/O operations and were designed to support debugging of programs for the Intel 4040, 4004, 8080 and 8088 and Fairchild F8 among others, UCC added from 7200 Stemmons Freeway, 75247.

### •PDP-8 Hosts F8 Code

SANTA CLARA, Calif. — A cross-assembler designed to run on a Digital Equipment Corp. PDP-8 and produce programs for the Fairchild F8 microprocessor is now available from Logic Systems.

The package supports shorthand or free-form input and formatted list output. Binary code for the micro is in "Fairbug" loader form, Logic Systems added. The cross-assembler user 8K of memory in an OS/8 environment and can be acquired for \$1,200 from the vendor at 437-A Aldo Ave., 95050.

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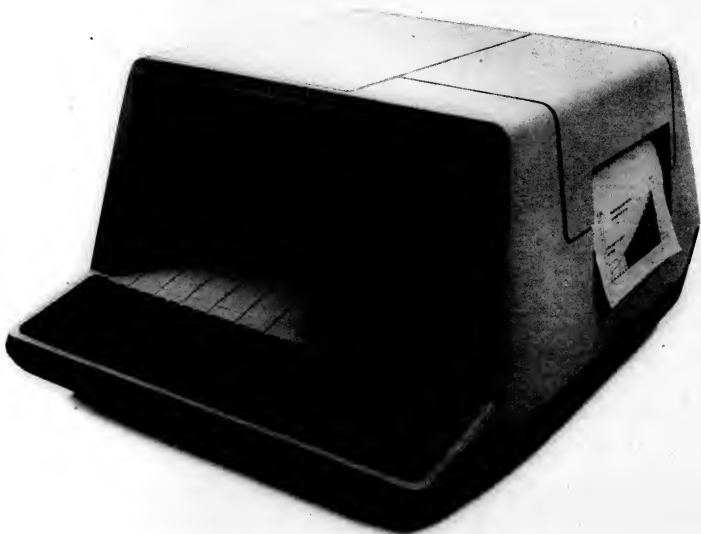
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## 'Easytrieve' Tied to Total DBMS

OAK BROOK, Ill. — Users of either DOS or OS Easytrieve from Panophic Systems, Inc. can work with the Total data base management system from Cimcom Systems, Inc. through a separately priced Total Option package now available from Panophic.

### Retail Shops Backed By On-Line's 'Pure'

PITTSBURGH, Pa. — Chain-store retail organizations can gain better control over acquisition and distribution of merchandise with the Purchasing and Receiving (Pure) system now available on the On-Line Systems, Inc. remote-computing network, an On-Line spokesman said.

The system handles replenishment of staple items as well as one-time purchases of fashion or seasonal goods, he added. Purchase orders are generated and sent to vendors as needed items are ordered and authorized by open-to-buy or merchandising management.

Upon receipt from vendors, shipments can be checked against purchase orders and against manufacturers' invoices. Status reports generated by the system keep buyers posted on open orders, overages, shortages and substitutions.

Pure is available through teletypewriter or CRT terminals in user offices linked by local dial-up phone lines to On-Line offices in 15 metropolitan areas.

Headquarters for On-Line Systems is 115 Evergreen Heights Drive, 15229.

### \$3,000 CDC-Oriented Routine Speeds Complex Curve Fitting

PITTSBURGH, Pa. — Curvfit from Cyber Associates, Inc. is described as a very high speed, general curve-fitting utility for use with Control Data Corp. CDC 7600 and 6000 series CPUs.

The routine is Fortran-CALLABLE and allows unpacked matrices, solving M equations in N unknowns where M is greater than N, the vendor claimed. Curvfit accepts one equation at a time, building the matrix, and performs a least-squares-solution when all rows have been processed.

Iterative use of Curvfit allows solutions of nonlinear systems through use of partial differential equations and evaluations of the function difference at each step, a Cyber spokesman added.

Written in Compass — the CDC Assembly level language — the Curvfit coding runs in 60 words of CDC 6000 memory and costs \$3,000.

A large matrix version of the software for Extended Core Storage or disk-based matrices, in which the user need not concern himself with direct manipulation of intermediate storage, is available for \$4,000.

Cyber Associates is at 3508 Fifth Ave., 15213.

The option package "is more than an interface" with the data base system, a Panophic spokesman claimed. Besides allowing Easytrieve to access Total files, it includes a Data Selection Feature that "significantly" reduces overhead when processing information from Total.

Although many retrieval packages have been interfaced with Total, they typically require everything in the data base to be passed to the report generator for record selection, the spokesman said. Easytrieve's approach is to select records or fields before they are passed to the report function, he explained.

The Total Option to Easytrieve is available on a perpetual basis for \$5,000, but maintenance after the first 12 months is \$300/year. Easytrieve itself can be acquired for \$12,500, with \$750/year for maintenance, if desired, after the first year.

Panophic is at 709 Enterprise Drive, 60521.

## XCS Aids Distributors

LOS ANGELES — Distributors with little or no DP experience will be able to manage order entry, billing, inventory, credit and sales analysis with the Xerox 1-2-3 system now available on the Xerox Computer Services (XCS) remote-computing network.

Designed to be price-competitive with some of the smaller in-house computer systems now available, Xerox 1-2-3 can be driven from a teletypewriter terminal in the user's office.

Large volume output can be directed to remote printer facilities in the nearest XCS sales offices for overnight delivery, the vendor said.

Each order entry, inventory or accounts receivable transaction entered at the terminal is posted to all appropriate ledger files. These in turn are then available for information retrieval, including the most current en-

tries, allowing the user to create optimal balances between stock levels and customer service.

For credit management, the system provides current customer status, delinquency statements, detail and summary aging reports. It also checks each customer's credit limits during order entry and simultaneously determines if inventory is sufficient to fill the order, the vendor said.

Sales management provides current month and year-to-date sales and gross profit contributions by customer, product and sales territory — or any combination of these parameters.

Stressing the idea that "any employee with a thorough knowledge of the company's business" can work with Xerox 1-2-3, the network provides "hands-on" operator classes. XCS is headquartered at 1510 Beethoven St., 90066.

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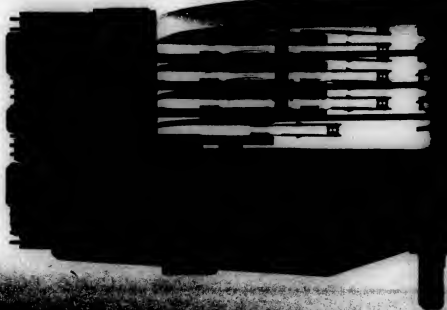
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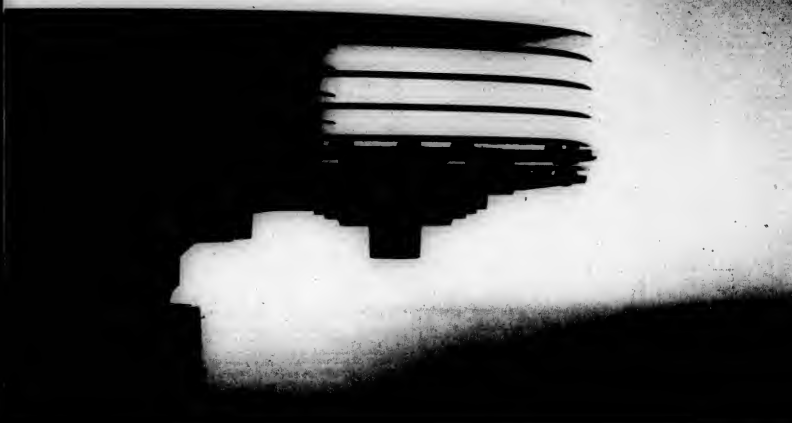
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# MEMOREXCELLENCE

# TA Can Ease Programmers' Communication Problem

By Gerry Richardson  
Special to Computerworld

This article is not meant in any way to imply that DP people have not "arrived" at the professional level. Most of the people I have talked with are definitive professionals of the highest order.

However, in researching the field over the past few years for the purpose of isolating specific areas where improvement was needed, I concluded the ability to communicate verbally is grossly lacking in the profession. By their very nature, DP and systems people are thoroughly rational, logical and unemotional; the business almost forces them to be. They almost become part of the electronic "creatures" they tend.

In the broad perspective, working in DP or systems analysis calls for:

- Input — the gathering of sufficient data through research or interviews.
- Processing — The bringing together of the gathered data in order to create a program or system which will hopefully meet the needs of the user(s).
- Output — The "selling" of the implementation, installation and/or funding of the program, system or "black box," once it is completed, by convincing the proper authorities that such is warranted on the basis of utility and the savings of money or time.

My research indicated DP and systems people were an unqualified success at the processing procedure, but more often

than not (mainly because of a lack of understanding of the verbal communications process) were abject failures at the input and output processes.

Obviously, the interview or information-gathering process is crucial to the success of the program or system. Perhaps not so

## Peopleware

obvious is the fact that the most sophisticated and progressively fantastic program or system ever developed is totally useless unless it is "sold," funded, installed and properly maintained. It will sit on the shelf and gather dust.

This usually happens when the programmer or analyst is more interested in self-esteem than implementation. Common messages communicated but not spoken to the user in this case are "Look how great I am!" or "What would you do without me?"

### TA Training

Thus, based on a perceived need for training in these areas, we at Richardson Associates created the seminar we call "Verbal Communication for Systems and EDP Personnel."

The basic training model is based on a nonpsychotherapy application of transactional analysis (TA), a little-known area of the behavioral sciences which was popularized by Thomas Harris in his book, *I'm OK, You're OK: A Practical Guide to Transactional Analysis*.

In the TA view, everyone is recognized to be three different people — Parent, adult and child. Each entity is called an ego state and should be used with full facility in a psychologically healthy person.

The parent in each of us is stern, accusing, forbidding, blaming and critical or soothing, consoling and nurturing.

The child in us is obedient, intuitive, fun-loving or rebellious. The adult part of our personality is rational, logical and unemotional.

The simplicity of explanation about the training model provides the seminar participant with a concept of how to deal with the people within the system or program. In other words, too often a programmer or analyst will consider only the program or system as an entity without giving much thought to the people who will be affected.

In addition, an operative clash often occurs between management and EDP systems people. The principle behind this clash is that management is basically the critical parent in orientation while DP and systems people are far too adult. Rationality, logic and a pronounced lack of emotion does not mix well with the managerial parent role which filters from the top down.

### Cross-Assembler for Intel

#### Executes on 16-Bit Minis

WALLINGFORD, Conn. — Another cross-assembler supporting development of programs for the Intel 8080 microprocessor through use of a bigger machine has been introduced.

The Micro-Tek assembler from North-east Services, Inc. is written in ANS Fortran IV and is said to execute on any 16-bit machine with that language capability.

Accepting user programs written in 8080 Assembly language, the package generates an assembled program listing and a hexadecimal object tape compatible with Intel's MCS-80.

The cross-assembler is designed to run in 10K and does not use disk. It is available for \$300 from Northeast at 34 Highland Ave., 06452.

The result of this interface is that the DP or systems person is often thought of as a necessary evil which must be tolerated. "After all, we bought these electronic monsters to show our stockholders that we're modern and up-to-date, but we don't have to like those wierdo's who run 'em!" I would be interested in knowing how many readers have either heard or felt that phrase before.

### Legitimate Questioning

The premise of such training is generic to the fact that most people assume that, given a mouth, a brain and a 1,500-word

minimum vocabulary, we know how to communicate. Yet we still have wars, murder, rape, divorce and suicide. Therefore, we can begin to legitimately question our communicability.

In the communications process, problems occur because we have not even been taught how the "pieces" move or fit together. Thus, when someone makes a mistake in talking to another person, either one or both walk away with bad feelings which are altogether unnecessary.

Richardson is president of Richardson Associates, Los Angeles-based consultants in the behavioral sciences.

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## From Users Surveyed by Datapro

# Harris Batch Terminals Win Top Performance Ratings

By a CW Staff Writer

DELRAN, N.J. — Remote batch terminals from Harris Corp. were rated highest in overall performance by respondents to a recent user survey.

Batch terminals supplied by Data 100, Datapoint and Computer Machinery Corp. (CMC) also ranked among those of IBM, according to the survey done by Datapro Research Corp.

The survey drew responses from 294 users with a total of 1,525 installed batch terminals. The users were asked to rate their terminals' overall performance, ease

of operation, hardware reliability, maintenance service and software and technical support.

Twelve types of batch terminals were rated by 10 or more users each. On a scale ranging from 1 for poor to 4 for excellent, Harris scored 3.6; Data 100, 3.3; CMC/Remcom and Datapoint, 3.4; IBM and Mohawk, 3.3; Singer/MAM and Sycor, 3.2; Burroughs, 3.1; Four-Phase, 3.0; Univac, 2.9; and Control Data Corp., 2.7.

Harris was also rated highest by users in software and technical support and shared top honors for maintenance service with Singer/MAM, CMC/Remcom terminals were rated highest in ease of operation.

Data 100, Datapoint, Harris and IBM would tie in a tie for the top position in hardware reliability.

Private voice-grade lines were used by

50% of the respondents, while 38% used dial-up telephone lines and 12% used other facilities.

The most popular transmission speed was 4,800 bit/sec., used by 43% of the respondents. Twenty-two operated at 2,400 bit/sec., 19% operated at 9,600 bit/sec. and 15% operated at 2,000 bit/sec.

Ebolic transmission code was used by 74% compared to 21% for ASCII and 5% for all other codes. Binary synchronous line protocol was the choice of 85% of the users, compared with 11% for ASCII and 4% for others.

### IBM Host With Most

Most of the host CPUs in the users' networks were supplied by IBM, with almost 40% having a 370/15 or larger machine. Twenty-two percent had CPUs that included machines in the 370/115 to

145 range.

Five percent had CDC mainframes, 7% had Univac systems and 4% had Burroughs hosts. Two percent of the CPUs in the survey came from Honeywell.

The major application was described as "dedicated batch," with 78% of the users checking this category while 10% said they operated key-to-disk data entry applications on their terminals.

The most popular terminals emulated by users was the IBM Hsp station with 121 responses while 86 said they operated in IBM 2780 mode. Others mentioned were CDC 200 User (29), Univac 1004 (27) and Univac DCT 2000 (15).

In the network configuration category, 91% operated point-to-point systems while only 8.9% had multipoint nets. The survey results are available for \$10 from Datapro at 1805 Underwood Blvd., 08075.

## Error Rate Low For Tran Data Set

EL SUGUNDO, Calif. — A synchronous digital data set that is said to reduce transmission error and impulse noise has been introduced by Computer Transmission Corp. (Tran).

The Intertran-2 data set operates with transmission error rates of one error in 10<sup>6</sup> bits transmitted. Its characteristics make the Intertran-2 data set "ideal" for local data distribution between terminals in educational, research and manufacturing campus-like environments where line lengths from 2 to 7 miles can be used, according to the company.

The unit transmits digital data over nonloaded unconditioned cable pairs or private lines. It has an EIA RS-232C/CITT V.24 interface with operator-selectable data rates of 2,400, 4,800 and 9,600 bit/sec.

The data set can interface to most data terminal equipment with its EIA interface and is described as transparent to data formats or patterns.

The digital unit eliminates all analog conversions and can transmit over four-wire, twisted-pair (19 to 26 AWG) private line or cable pairs provided by a common carrier.

While the basic operating mode is full-duplex for maximum throughput, the Intertran-2 data set can also operate in half-duplex mode.

Two diagnostic tools are included in the data set. One, a logic loopback, is used to check the line and the remote set. Line loopback is also available for testing the local data set.

Loops beyond the normal operating range of the Intertran-2 set use two data sets, one as a repeater for the link.

Purchase price for the Intertran-2 data set is \$685. Tran is at 2532 Utah Ave., 90245.

# Regulation Hit for Favoring Big Business

By Ronald A. Frank  
Of the CW Staff

BOSTON — Recent regulatory trends "appear to be supporting the interests of big business and vested interest groups... directly damaging the small business man," Minor Huffman Jr. said here recently.

Huffman, who is president of the Center for Communications Management, Inc., a research firm, said in the past three years most small to medium-size users have experienced an increase in communications costs of over 30% while the boost for big business, which enjoys bulk discounts, has been less than 10%.

The Federal Communications Commission's policy of competition in the private line area has created a situation where the smaller user will have to subsidize the large user, the government and the specialized common carriers, he said.

As a solution, Huffman proposed raising private line rates to a point "sufficient to protect" dial-up and Wats rates. This would correct the discriminatory rate structure which favors big business, he said.

He called for future rate increases to be equally applied to all types of business users and a moratorium on issuing operating permits to new specialized carrier applicants.

Huffman also suggested a special use fee on all private line facilities and an "inverted pricing schedule for peak hour phone traffic" such as that used by power companies. The latter would allow the smaller user to escape having to support a phone network designed to accommodate the "very large business telecommunication

systems," he said.

While the small-to-medium-size business organizations are not presently as vocal as their big brothers and do not enjoy the support of the self-appointed "consumer

## Controller Allows Wang 2200 To Emulate IBM 2780 Format

TEWKSBURY, Mass. — Wang Laboratories, Inc. has introduced a telecommunications option which allows Wang 2200 computers to communicate with IBM System 370s and other host CPUs as an IBM 2780 remote batch terminal.

The Model 5181 communications controller initially supports binary synchro-

### T-Bar Has Transfer Switch

WILTON, Conn. — T-Bar, Inc. has a switch that can be used to transfer CRT terminals, such as the IBM 3270, between different controllers.

Designed to reduce the time required to restore a terminal to service in case of a controller channel fault, the switch comes in eight-channel or 16-channel versions. Both the signal conductor and the shield of the coaxial circuit are switched simultaneously.

The Model 5181 for eight channels costs \$800 while the Model 5182 for 16 channels costs \$1,200 from T-Bar at 141 Danbury Road, 06897. nous communications designed with the Ebclic character set at speeds of 2,000,

advocates," they deserve better treatment than they are now getting. Huffman said at the recent annual conference of the National Association of Regulatory Utility Commissioners.

2,400- and 4,800 bit/sec on a dial-up basis. All transmission control, including error checking and retransmission, is handled by the Model 2228 hardware.

### Emulator Program

The communications controller comes with a terminal emulator program which loads the microprocessor, allowing the 2200 to emulate the communications protocol of an IBM 2780 terminal.

A Wang configuration with the Model 2228 can therefore communicate with an IBM processor as a remote batch workstation with "no changes" to the supporting 370 teleprocessing software, the company said.

Equipped with the Model 2228, the Wang 2200 retains all of its stand-alone processing power, Basic language and peripheral capabilities and adds the ability to operate within the IBM communications environment.

The Model 2228 communications controller is priced at \$2,500, including the terminal emulator program, with rental and leasing plans available. Delivery is four weeks from 836 North St., 01876.

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## Teletypewriters Replaced

# Dealership Net Finds Terminals Solution to 'Data Lag'

By Peter Granson

Special to Computerworld  
DAYTON, Ohio — Reynolds and Reynolds Co. (R&R) has added data terminals to its automated dealership accounting system.

Subscribing dealers who selected the Texas Instruments Silent 700 programmable terminal over the traditional mechanical teletypewriters are now able to edit input data locally, perform preprocessing and subsequently transmit and receive critical decision-making information between their dealerships and the firm's regional processing center.

ters.

The automated dealership accounting service evolved from an adding machine type of input to a system consisting of a network of teletypewriters tied together by six regional polling centers equipped with Burroughs B4700 computers. Clerks at individual dealerships entered daily operating data into a mechanical teletypewriter from standard forms. At night, each processing center collected data from terminals in its region over telephone lines. The regional computer would edit and format the data and subsequently generate account-

ing records and a daily operating control (DDC).

The accounting records were

then mailed back to the dealer and the DDC was transmitted daily via telephone lines. The mailing of accounting records to dealerships was causing some unwanted "data lags" in the system.

Prompted by this situation, R&R set out to find a method for reducing overall data communication cycle time. And, af-

ter considering several options, it decided to replace existing mechanical typewriters with Silent

700 Model 742 programmable data terminals.

"Our concern was that the automobile dealer was not able to obtain a reliable, inexpensive terminal to fill his data communications needs," according to Arnie Cantrell, director of marketing for R&R's DP division.

"With the Model 742 terminal, that need has been fulfilled," he said.

Dealers using the programmable model can transmit and receive data at 120 char./sec and generate hard-copy output at 30 char./sec. This terminal capability between dealer and regional

centers has eliminated the data lag problem and increased printing and data transmission rates.

Monthly line costs were reduced through increased line throughput.

In addition, dealerships using the programmable terminals realized a number of other advantages. The Model 742 automatically performs field checking, range checking and zero balancing of general ledger accounts (source editing) locally, which means there is essentially error-free data entry.

Also, blocked transmission protocol in which data is transmitted in 425-character blocks provides a checking scheme to ensure correct data is sent between each Model 742 and R&R's regional processing centers. These two features alone result in better line utilization and a corresponding reduction in line costs.

Operator training and data entry time are simplified because of the programmed lead-through procedures. The terminal printing used by the terminals reduces office noise levels.

R&R has noticed an improvement in overall reliability which keeps maintenance requirements to a minimum.

Granson is product coordinator for accounting marketing at Reynolds & Reynolds Co.

## Terminal Transactions

## IDS Modules Aid Control Center Design

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has introduced the Series 8900 Minitech modules which incorporate a modular approach to the design of technical control centers.

Plug-in modules provide front-end processor switching plus patching and monitoring for the 25 lines at the EIA interface and the four lines at the telephone line analog interface, IDS said.

Sixteen channels of switching along with a controller and power supply are housed in the system. The push-button magnetically latched switches, which IDS said are immune to power failure, can switch a single chan-

nel or simultaneously switch an unlimited number of channels through a chaining feature.

In addition to A-B switching, the modules provide a 25-wire monitoring port, continuous LED indication of receive data, transmit data and carrier detect signals and a 25-wire channel-to-channel patching capability.

Analog switching, patching and monitoring capability is provided by the Model 8904 16-channel (four-wire) full-duplex analog patch and monitor module packaged in one rack-mountable panel.

A 16-channel EIA system is priced at \$4,175. The 16-chan-

nel analog system is priced at \$650. IDS is at 100 Nashua St., 02904.

## SSC Has Programmable Interface

SALT LAKE CITY, Utah — SSC Corp. has introduced a programmable interface for message switching and communications formatting which can be used in digital interfacing applications. Particular applications include speed conversion, mode conversion, code conversion and data routing, SSC said.

The unit can be used in various combinations of asynchronous and synchronous applications.

Multiline data routing functions, such as message concentrating, line monitoring and terminal multiplexing, can also be handled.

The unit features a microprocessor as its programmable control unit. Serial inputs and outputs meet EIA RS-232C standards.

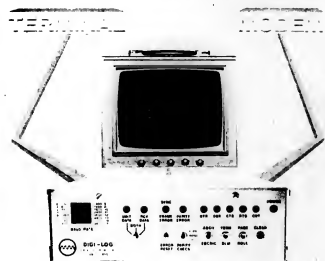
Price including initial program is \$2,200. SSC Corp. is at Research Road, 84112.

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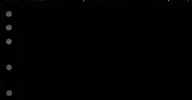
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Circle 10 on Reader Service Card



Photographed on location in Miami Beach, Florida.

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## N.Y. Bank's Network Based on Four Minis Has Worldwide Scope

NEW YORK — A message-processing system with a potential for speeding global transmission of data at electronic speeds has been introduced by Citicorp.

Called Citiswitch, the system links the head office of Citicorp's main subsidiary, First National City Bank, with main branches throughout the world. By year-end the communications network will include over 40 locations in New York and 78 overseas.

The system, made up of four minicomputers including backup equipment, automates the paper and the labor-intensive wire and cable units located at 111 Wall St., where most of the message traffic for Citicorp was received over teletypewriters for internal routing via facsimile and messenger service.

### No More Long Waits

Before Citiswitch, it was possible for a message to take hours to reach its destination because of the multiple handlings involved. The manual process involved tearing the message off the receiving unit, stamping, checking, sorting and often delivering it to another building where it was sorted, sent through the bank's pneumatic tube system, picked up, logged and finally routed to the addressee.

With Citiswitch, the message is entered via CRT intelligent terminals and routed to its final destination electronically. The message is printed at a terminal located near the addressee.

The electronic signal is brought directly to the computer and structured messages can be accepted and processed at once.

If a text word is necessary as part of the message, the system passes it over to computers at the Message Diagnostic Center (Medic), which encodes the text word according to data entered in the "message header," the first five lines. Messages that cannot be routed by the switch are passed over the Medic, where an operator can look at the message on a display screen and alter it as necessary.

By year-end, it is anticipated that the system will be processing over 20,000 messages per day.

## Telenet Adds Centers, Increases Total to 16

WASHINGTON, D.C. — Telenet Communications Corp. has added nine switching centers, increasing the number of central offices in its nationwide public data communications network to 16.

The Telenet central offices are located in Atlanta, Cleveland, Detroit, Houston, Minneapolis, St. Louis, Pittsburgh, Philadelphia and Newark.

More than 15 customer host computers were connected to the network in the first three months of service, according to Telenet.



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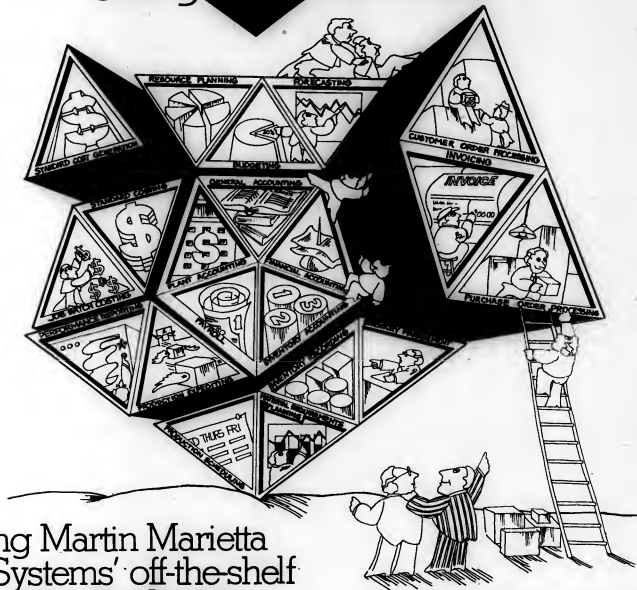
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Cost Control	25	2	10
Order Control	34	2	10
Manufacturing Control	60	2	12
Financial Control	176	3	15
Business Planning	45	2	10
	510	2.3 Average	12 Average

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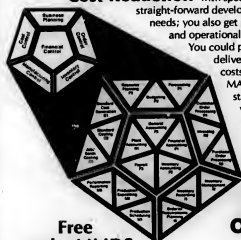
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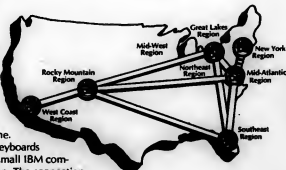
You could pay a lot for that sort of assured delivery and pay-off. Home built code costs typically \$6 to \$10 per statement. MAS code goes at \$1 per statement, standard. If you want it customized, you might push this up to \$2 per statement. An 85% to 90% savings at best. Highly customized: a 65% to 80% savings. For systems that are better than home built, and can be delivered tomorrow.

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# SYSTEMS & PERIPHERALS

## Service Bureau Runs 3330-Type Drives on 360/40

By Patrick Ward  
Of the CW Staff

BURLINGAME, Calif. — A service bureau here converted two IBM 360/40s to run on a 370 operating system last spring so the 40s could support 3330-equivalent disk drives.

Currently a 40 and a recently installed 360/50 are sharing eight spindles of Irel 7330-2 disk drives.

The changes that were begun to bring in the 3330-equivalent disks "have helped business quite a bit. We can get 370 overflow work now; we can be backup for a 370; and we can go to a 370 and use it as backup," said William K. Brest, operations supervisor/development analyst at EBS Data Processing here.

The service bureau handles inventory control, medical billing, hospital business

DP and a range of other accounting applications.

It has branch offices in Glendale and San Diego, Calif.; in Denver; and in New York and New Jersey.

Last February, the two 360/40s were using eight dual-density disk spindles of Control Data Corp.'s 2314-type drives and were running out of disk capacity.

"We had just gone into a joint venture with Professional Automated Services in Miami," Brest said, "and we had to either add additional disk drives or get a different type of drive."

Intel offered to install its 7330-2s, which are lightly slower 3330-type disks, but EBS would be the first 360/40 shop to use them.

"We didn't even know if it was going to work," Brest said. But the experiment

offered the advantages of faster transfer rate, more throughput and higher total disk capacity. EBS decided to go ahead.

"Installation was very difficult at first," Brest recalled. "We had a few red lights on the 40s."

Intel installed IBM's Release 27.1 of DOS and brought in the Intel TM/370 program to convert 370 instructions for the 360. During this installation phase, an Intel software specialist changed TM/370 from a 6K, core-resident program into a more economical supervisor macro, Brest said.

Intel and EBS modified the Release 27.1 compilers and the shop's 360 utilities and 1401 emulator to work with 3330s.

The shop used the Sprint spooler from Jason Data Services to merge libraries directly from the 2314s to the 7330-2s.

Use of IBM's Device Independence package allowed the shop to run its production programs almost immediately.

Brian Peterson of the EBS programming staff put together a program to convert 2314 job control language (JCL) to 3330 JCL.

### Overnight Conversion

"The only programs we had to relink were Isam files and any programs that had random read/write," Brest said. "We did an overnight conversion of 2,400 programs."

Brest placed an order with IBM for his own copy of Release 27.1, but ran into "a little difficulty in getting it. IBM kept superseding the order and telling me that I only had Model 40s and that the release would not run on Model 40s," he said.

Once the new configuration was up and running, Brest noticed from 10% to 30% more system throughput, depending on the job.

Two controllers and a two-channel switch enabled both CPUs to share the 7330-2s. The new drives had more than twice the capacity of the 2314-type units and took up half as much space. Transfer rate was higher too.

"We attempted to hook up Intel 7330-1 drives on the 40s, but we could never get over the problem of the 40s not accepting a full-speed 3330-type device," Brest said.

EBS ran the two 40s from May to August with the two CPUs sharing a common library and still using Sprint. The company then replaced the 196K 40 with a 384K 360/50, which can deliver 80% to 150% more throughput, Brest said. EBS plans to add 5M bytes of additional memory to the 50 shortly.

## Data 100 Adds Key-to-Diskette Station

MINNEAPOLIS — Data 100 Corp. has introduced a dual-station key-to-diskette data-entry and communications system that is designed for low-volume sites in distributed networks, according to the firm.

The system permits one or two operators to enter, edit, verify and store data on the diskette under the control of data-entry software. Data can then be transferred to another diskette, printed on the system line printer or transmitted in batch mode via the IBM Biscynchronous Communications (BSC) discipline.

The remote-entry system allows use of prewritten input formats. The format-generation option can be ordered on one machine, which can serve the others in a network.

### Data Entry Features

The Model 77 provides fixed entry validation, accumulators, arithmetic and logic functions and input/output formatting.

Data output can be directed to the communications facility or, using the system data-management capabilities, to the line printer, auxiliary data disk or keystation display. Data preparation modes are:

- Entry — This mode allows an operator to enter source data on a keyboard. The system validates the data according to the checks defined in the input format, assembles the keyed characters and stores them on the disk at record intervals.

- Verify — In this mode the operator reenters the data requiring verification. The system compares it against the original data and indicates error conditions.

- Search — This mode allows the operator to locate and retrieve records in order to correct, change, insert or delete their contents. The search is made against a keyed argument (a mark equal to any



Data 100's Model 77 Remote Entry System

portion of the record content) or unique record number. The located record is displayed, allowing the operator to correct or delete it.

- Update — This mode is used to re-store duplication or arithmetic relationships which might have changed since the records were originally keyed. The update operation is performed automatically on all records of a file without operator intervention.

- Directory — This mode allows the operator to display or print the contents of the system directory. The directory is an alphanumeric listing of all file names currently in the system.

- Definition — This optional mode allows an operator to create new control formats for the system. Using this mode an operator may create new formats (input, output or fixed entry), revise existing formats, delete formats or transfer them to the line printer or communications facility.

The following communications features are available:

- Point-to-point or multipoint.

(Continued on Page 31)

## Intel Claims Price Advantage, Removable Media for Its 3350

SAN FRANCISCO — Intel Corp.'s 3350 disk drive equivalent [CW, Nov. 12] will cost "10% to 30%" less than the IBM product, according to an Intel spokesman. He declined to give further price information, however.

The Intel 7835/7330-12 disk storage subsystem is said to be software-compatible and functionally equivalent to IBM's 3350 disk storage. However, the recording media can be removed from the Intel drive and mounted on another for on-site data recovery.

The Intel 7835/7330-12 has a capacity of 317.5M byte/spindle. It offers a standard four-channel switch feature which allows connection of up to four CPUs to a common data bus.

Customers can install the Intel 7330-10

and 7330-11 (compatible versions of IBM's 3330-1 and 3330-11) now and at a later date upgrade in the field to a 7330-12, as data base needs increase.

Intel is at One Embarcadero Center, 94111.

### Burroughs to Raise Prices

DETROIT — Burroughs Corp. will increase most maintenance charges by 9% on Jan. 1. Most purchase and lease prices will also rise, but by smaller percentages. Burroughs said it will boost lease rates 2.5% to 4% on small-scale computers other than the B700 series. Both purchase and lease prices on medium- and large-scale mainframes will go up 2.5% to 4%.

The purchase and lease rates for peripheral products will rise from 3.5% to 4%.

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# Hasty Decision to Use COM May Bring Disappointment

By Patrick Ward  
or we cow start

NEWPORT BEACH, Calif. — Users who decide to turn to computer output microfilm (COM) out of frustration with rising output costs may be risking disappointment over the long run.

Those users may fail to do a thorough analysis of possible COM applications in their companies before they bring in the equipment, according to Kenneth M. Iversen, marketing support manager for Bell & Howell's COM products line.

Later on, when the users would like to add other types of COM jobs, they may find the COM equipment they originally chose is inappropriate for the applications they want to add, Iversen said.

DP people who may be very professional in choosing other types of equipment for their sites will "rush right into this technology because they still view it as a film and chemistry product," not DP

gear, he said.

COM only began to be accepted into DP circles in 1973 and 1974 when increasing paper costs, combined with the business recession, pushed DPs toward doing something about the spiraling cost of output, Iversen said.

"A lot of COM decisions have been made up to now as an expedient to solving a bottleneck and not from a typical DP systems approach to making a decision," he emphasized. Even under these circumstances, he said, COM has finally won acceptance from the DP community as an output method.

## Systems Approach

Future COM use will come from systems analysis of output alternatives pinpointing applications that COM can handle less expensively than other output methods, Iversen said.

Key-to-disk, intelligent terminals and

on-line entry have all speeded up the process of getting information into a data base over the last several years, Iversen said. As for getting the information out of that data base, the choice was between CRTs and on-line printers until COM came along, Iversen explained.

Printers are a relatively slow output method; their output is bulky and has to be copied for mass distribution, he said.

CRTs provide information quickly, but require direct access to storage files, additional CPU memory and a network of terminals.

"If you look at COM with a systems approach, you can see there's a range between printed paper and CRT displays" in which COM is the best solution, Iversen said.

For example, "the 2,000th copy of a microfiche sheet is as good as the first." Since the user can put the equivalent of 270 computer output pages on one 4-in.

by 6-in. microfiche sheet, it's possible to send the same daily report to hundreds of people in an organization, he said.

"Perhaps the biggest resistance to COM comes from people who want to write on their copy of a report. But that can bring the problem of having written notes on an old report when a newer version of the report comes in," he said.

Again it's a systems question, he said. "The COM user can make notes separately and keep them as reports and go," he suggested.

## Bits & Pieces

### Tape Crimper Cuts Mylar

NATICK, Mass. — Pericom Corp.'s Tape Crimper is a hand-operated cutter used to cut and form the end of 1/2-in. mylar computer tape to enable positive loading of automatic threading transports.

The end of the tape is cut to a 9/16-in. diameter. At the same time it is cut, the end of the tape is formed with three ribs approximately 1/2-in. long and 1/32-in. high, which stiffens the leading edge of the tape.

The Tape Crimper costs \$28 from the firm at 14 Huron Drive, 01760.

### Tape Duplicator Works in 30 Sec

PASADENA, Calif. — The D-200 tape duplicator from Sunrise Electronics automatically reproduces either or both tracks of a 100-ft digital tape in less than 30 sec, the company said.

The D-200 duplicates tapes in all popular digital formats, according to the firm. Signals and control inputs and outputs are available at a remote receptacle on the rear of the machine for slave operation and control.

The copier can be used to automatically certify tapes, will rewind automatically and can be used to merge information from several tapes onto one new tape, the company said.

Base prices for the D-200 start at \$2,100 from Sunrise at 228 N. El Molino Ave., 91101.

### Touch-Pop Holds Cassette Tapes

WHEATON, Ill. — The Touch-Pop cassette tape storage system from AV Industries, Inc. can be used to file standardized cassettes with the top-side labels visible for easy identification, according to the vendor.

The plastic holder trays protect the tapes from dust, handling deterioration and accidental bulk rotation, AV said. The cassettes snap into the holders and are ejected by slight thumb pressure.

A two-drawer cassette cabinet costs \$79 and a four-drawer unit costs \$110 from the firm at 400 W. Liberty, 60187.

### Device Allows Fiche Inspection

PAISADES PARK, N.J. — The Type C Microfiche Inspector from Pepco MFI is said to allow the user to inspect original or duplicate cut microfiche sheets one at a time.

The Type C projects a 105mm by 148mm fiche image onto a 22-1/2-in. by 30-in. rear projection screen at 5.5X magnification. This projection permits inspection of the entire fiche's format, focus, gross density, page order and alignment.

Closer examination at full-size blowback is realized by sliding one or more self-contained lenses into place. At full-size blowback, the screen shows six document or four computer output microfiche frames simultaneously.

One or two full-size blowback lenses are available.

The device costs \$3,125 from the firm at 544 Tenth St., 07650.

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## At Electric Company

## Early-Warning System Guards Against Power Failure

PHILADELPHIA — Philadelphia Electric Co. here uses a computer-based early-warning system to guard against the kind of massive power failure that darkened the Northeast 10 years ago.

Shortly after the System Automatic Monitoring and Control System (Samac) went into service in October 1973, switching problems isolated a generating station and some substations it supplied from the rest of the network.

Voltage and frequency had risen at the station, but one of the Samac operators in the Systems Operations Office here was alerted both to the problem and the appropriate corrective action within seconds by his bank of four-color CRT displays.

That occurrence was the closest the company has come to any serious situation because Samac catches developing problems in time to prevent them from achieving major proportions. In short, the primary advantage of the system, built around a "triplex" Burroughs Corp. B6700 computer system lies in what it does not permit to happen.

By contrast, in June of 1967, a transmission line became overloaded. Samac would have pinpointed this immediately, if it had been installed at the time, but the result was a serious power disturbance that shut down the entire Philadelphia Electric system, which serves four million people in a 2,340-square-mile area in southeastern Pennsylvania and northeastern Maryland.

It also shut down part or all of the neighboring companies in the Pennsylvania-New Jersey-Maryland Interconnection (PNJM) of which Philadelphia Electric is a member.

## Task Force Named

A task force was named to study how to prevent this in the future. Its recommendation was that system operators

should have more complete and timely information, based on monitoring a minimum of 800 points, each at a rate of 30 seconds or less.

It is impossible for humans to do this, so the decision was made to feed the data into a computer, compare it with normal values and warn operators immediately if anything approached a potentially hazardous condition.

The result was Samac, which now monitors, via remote terminal units, more than 2,000 points on generators, transformers, lines, etc., at more than 40 different locations on the bulk power transmission system, including 10 generating stations and about 30 substations.

Critical variables such as generation and tie-lines to neighboring companies are sampled every three seconds, but the bulk

of the data is sampled every 30 seconds. Communication with the operators is via color CRTs.

These CRTs display the generation and bulk power transmission system in blue, yellow, green or red symbols. Blue, yellow and green are used to designate different voltage levels, and red indicates an abnormal condition.

The CRTs also display detailed information concerning the line, transformer or substation involved and print out the recommended procedure to be followed.

One bank of 10 CRTs is located at the shift supervisor's position and the other at the power director's position. Each provides a mimic diagram of the system. Below are three additional CRTs used to bring up the representations in greater detail, such as a single-line diagram of a

particular station.

Since monitoring and control are completely dependent on the computers and there is no backup analog system, the reliability of the computers is of the utmost importance.

Consequently, the company installed the first commercial B6700 "triplex" or three-processor system with "fail-safe" programs which include an automatic re-configuration capability in case part of the computer system fails.

The B6700 is fed from three uninterruptible power supplies, and if all outside power should be lost, continuous power from large batteries can sustain the system for up to 30 minutes, although a diesel generator would automatically start within three minutes to take over for the batteries.

## Wake me when it's over

Read the Year-End Review and Forecast, a special Supplement in the December 31st/January 7th combined issue of Computerworld.

What sort of a year was it? A year like all years... filled with those events that alter and illuminate our times. And you were there, as Walter Cronkite used to say. Now it's time to leave the trees and sit back for a good look at the forest. And that's what we'll be doing in our special, combined December 31st/January 7th issue.

Edited by Drake Lundell, this special issue will review all the big stories in the 1975 computer world... from developments in hardware, software and communications to changes in computer law and the impact of computers on society. It'll be an excellent overview of what's happened, combined with some knowledgeable forecasts of what's going to happen in 1976. And if you have anything to do with computers, you should be there on December 31st.

If you're a DP marketer, remember the closing date for this special issue: December 12th. Contact your Computerworld salesman for complete details. Or call Judy Milford at (617) 965-5800.

## Data 100 Launches

## Key-to-Diskette Unit

(Continued from Page 29)

- RS-232C — 2,000- to 4,800 bit/sec communications capability
- Leased or dial-up, two-wire or four-wire lines
- Auto answer for unattended transmission and reception

## Two Types of Keytations

A keytation may be equipped with either typewriter- or data-entry-style keyboards and consists of a movable keyboard, display unit and operator table. A display unit presents characters in eight lines of 32 positions each for a total of 256 characters.

An operator error is indicated by an English-language display message, an indicator on the keyboard and an audible alarm.

The remote-entry station can accommodate up to three diskette drives (two are standard). The number of drives required depends on options selected. The unit uses IBM media-compatible diskettes. A 62 line/min belt printer with 63 Ebcodic character set and a 125 line/min belt printer with 63 Ebcodic character set are available.

A typical Model 77 with communications, two diskettes, a single keytation, the optional local formats feature and a 62 line/min printer rents for \$585/mo on a one-year lease including maintenance. Purchase price is \$20,118. A second keytation, with a third diskette, rents for \$110/mo and increases the purchase price by \$3,570.

Data 100 is at 7725 Washington Ave. South, 55435.



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## Survey by GAO to Show

# Use of Minis in Government Doubles Between '67, '74

By Nancy French

**NEW CARROLLTON, Md.**—Results from a General Accounting Office (GAO) study that will be released soon indicate minicomputer use in the government more than doubled between 1967 and 1974—and 82% of those surveyed envision even wider use in the future.

The government minicomputer population grew from 3,700 in 1967 to 7,800 in 1974, Walter Anderson, GAO associate director for DP and financial and general management studies, told a group of 200 industry and government executives at a three-day minicomputer symposium held here recently by the American Institute of Industrial Engineers and Management Education Corp.

The study was undertaken to determine just where minicom-

puters fit into the government DP picture, according to Anderson, and all users who responded gave minis high marks for performance.

### Excellent Performance

In the survey, a total of 94% of the respondents rated overall performance as excellent or good—39% reported excellent and 55% good. Five percent indicated performance was fair and only 1% reported performance was poor.

The study found 52% of the minis were used for scientific experiments and data processing, process control, communications, input/output and other applications were in the minority. Only five users reported their systems were used for more than one purpose.

Asked why minicomputers were acquired, 44% said they

were acquired to automate something previously done manually. Only 2% used minicomputers to replace larger systems, and 10% acquired minis to augment other systems.

with in-house personnel, while 39% received software from the manufacturer.

About 11% used an independent software developer and 11% obtained software from a

sponsor from 151 government users, Anderson said.

With respect to some of the problems caused by limitations of the computer system's capabilities, only 10% to 15% reported any problem in the categories of instruction set, word size and numbers of registers.

In the area of storage capacity, however, 40% indicated this limitation caused them problems, but the general tone of the responses was "highly positive," Anderson said.

The review attempted to determine what problems government users encounter with minicomputers, Anderson said. One problem was that the same level of procurement control was often exercised for a low-cost mini as a higher priced major system.

"I personally counted 34 circulars, regulations and bulletins that applied to DP procurement and management," he said, "and this does not include armed services procurement regulations."

However, during the course of the review, some of these regulations were changed, he pointed out.

"It's also interesting to note the drop in cost between 1967 and 1974," Anderson said. A quarter of the computers in 1967 cost \$50,000, whereas

(Continued on Page 34)

## CW at Mini Symposium

"If we had to pick a weak category, we would say 'manufacturer's technical support' was the weakest, but even in this category more than half the respondents indicated excellent and good rather than fair and poor," Anderson said.

### Applications Software

With regard to applications software, 65% of the respondents developed the software

system supplier. Only 3% used more than one source for applications software, he said.

As for programming language, 44% said they used Assembly or machine language, 7% used Basic, 11% used Fortran and 11% used other languages.

Not one user reported using COBOL, but 26% said they used more than one programming language.

Findings were based on re-

sponses to a questionnaire.

"You'll let it go for a month,

"What you need is two large disks—5M or 10M bytes each."

He also pointed out the average user of the \$20,000 to \$30,000 minicomputer should expect to spend another \$6,000 to \$7,000 on software.

## Service Seen Consideration in Buying Mini

By a CW Staff Writer

**NEW CARROLLTON, Md.**—"Buying a minicomputer is like buying a car—you don't buy the biggest and the best if the dealer in your area gives poor service," Chuck Burkus, president of O.G. Enterprises, Inc., an independent firm specializing in medium and small business application systems, said here recently.

Burkus made the point before an audience of about 200 government and industry people attending a three-day minicomputer symposium sponsored by the American Institute of Industrial Engineers and Management Education Corp.

"A minicomputer is a big investment for the first-time user. The only way he can justify that investment is if the system saves him money or helps provide better service to his customers without added cost," he said.

Automating inventory and accounts receivable and generally improving the company's cash-flow problems is usually the first application, he added.

### Four Options

Before buying, the businessman should make certain a serv-

ice bureau wouldn't serve him as well at less cost. Unfortunately, he said, here the businessman is faced with several days' turnaround, especially at quarterly reporting time when all the service company's customers want their reports.

Second, he could share a system with another firm. That's not such a bad choice but, in this case, a user can't always get machine time when he needs it, he stated.

The third choice is tying in with a time-sharing firm. While this option is the most flexible of the three, it can cost a lot of money, Burkus claimed.

"For the \$20,000/year time-sharing might cost, the businessman could buy two minicomputers over two years' time and only plug in the second one for backup," he said.

In making his decision, the businessman must ask himself how many hands his input goes through before it gets into the computer and gets back to him, Burkus advised. He will realize that, with all the other choices, he loses control of his files and his input, he said.

In this case, buying a small minicomputer is the best choice.

Besides service problems, the mini presents several other problems of which the small businessman should be aware.

Users must think about configuration. "It's ridiculous to back up a disk with 38 diskettes or 20 cassettes, for example. It takes so long to back up the system

## S/3 Called 'Worst Buy on the Market' When Only Cost per Calculation Examined

By a CW Staff Writer

**NEW CARROLLTON, Md.**—Based on cost per calculation, the IBM System/3 is probably the "worst buy on the market," John White, senior computer scientist for Computer Sciences Corp., told attendees at a three-day minicomputer symposium held here recently. But a user pays for "great support and service" in that price, he added.

"When your system is down, IBM will be there in two hours—its people may not be able to fix it any more quickly than the other vendors, but it'll surround your machine with

people," he said.

Average response time for other mini vendors is four to six hours, he claimed.

Other recommendations White made to about 200 government and industry members who expressed interest in how minis perform compared with their larger, more expensive DP machines included the following tips.

Digital Equipment Corp. is primarily a hardware vendor. While it will provide a minimum of software to the end user, it is principally OEM-oriented—it looks to systems houses to package its systems, he explained.

As for how to be sure the user is getting the best, White noted that in the minicomputer field there are relatively few unique CPU designs.

"If you look inside DEC's RP04 disk drive, for example, you may find the name 'Univac,'" he said.

"New designs are copied quickly," he said, adding, "if one vendor introduces a truly unique CPU design, its competitors can offer a copy in three to six months."

As for cost, White pointed out a minicomputer with a 32K memory, a console and disk stor-

(Continued on Page 34)

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## Qantel System 1300 Compatible With, Four Times Faster Than Earlier Models

HAYWARD, Calif. — Qantel Corp. has upped the speed and capacity of its line of small business computer systems with the introduction of the System 1300.

The system is fully compatible with earlier units from the firm and can be field-installed with current software and peripherals, the firm said.

In addition to providing internal processing speeds an average four times faster than those of other Qantel systems, the System 1300 expands memory capacity to 128K, the firm said.

Priced at \$23,500 for delivery in early 1976, a minimally configured System 1300 includes 40K bytes of memory (8K of which are available to the user), 6M bytes of disk storage (3M bytes fixed, 3M bytes removable), a 27-line, 1,728-character display terminal and a medium-speed serial line printer.

"To our knowledge," according to Qantel President Douglas K. Baker, "this is the first time in the mini-based business computer marketplace that a manufacturer has introduced a substantially faster processor that is completely compatible with its existing hardware and software product lines and that therefore can be installed in any existing installation without the need for a change of software."

#### Uses Base Registers

The 1300 processor uses base registers to dynamically address memory, avoiding prior necessity for program relocation and excessive data indexing, Qantel said.

In addition to executing the

entire instruction set of the current Qantel processor, the System 1300 processor provides additional instructions.

Stacking instructions handle both program pointers and data, simplifying the generation of re-entrant code. More powerful MOVE, SEARCH, TRANSFER and COMPARE instructions accept indirect lengths for data movement and comparison, eliminating the need for such subroutines and providing as much as a 10 to 1 performance improvement in some data

analysis functions, the company said.

The System 1300 is compatible with Qantel's Best operating system. Complete software support for the system's 128K hardware capability will be available in early 1976.

Comparative tests run showed a 2 to 1 improvement, with some tests producing as high as a 3.5 to 1 performance improvement, the firm claimed.

Faster interfacing between peripheral and processor is also achieved, it added.

## Miniworld Products

### Amplex Add-On Memory Gives 32K to Nova 2s

MARINA DEL REY, Calif. — Amplex Corp. has added a 32K-byte add-on memory which is pin-compatible with the Data General (DG) Nova 2 to its family of minicomputer memories. The Amplex ARM-2 offers data access in 280 msec and 400 msec (full-cycle operation in 16K modules). "The cycle time of the 16K word module permits the CPU to operate at a faster effective speed than the equivalent DG 16K module," Max Bennett, vice-president, said.

A user can therefore maximize his computer operating speed while saving 20% on memory cost and also free card slots for other functions, according to Bennett.

The 16K module operates in an ARM field or in up to four

nonsequential 4K address fields. The module is compatible with all models of Nova 2 and no modifications of any kind are required to either software or hardware.

The 16K word ARM-2 is priced under \$2,000.

#### Tycom Bases I/O Printer

FAIRFIELD, N.J. — An input/output printer based on the standard IBM Selectric is being offered from stock by Tycom Systems Corp. here.

The Tycom 735 utilizes the Holmes Tycom baseplate and converts any Selectric II or Selectric III into an I/O printer. The Tycom system is similar to the IBM 735 I/O printer which, until IBM announced its discontinuation, was the only other Selectric-based I/O printer on the market, according to Tycom.

Price of the Tycom 735 is \$835 from the firm at 26 Jue 07, 1976.

#### MDB Has PDP-11 Interface

ORANGE, Calif. — A Digital Equipment Corp. PDP-11 Unibus-to-peripheral interface with address and dual vector interrupt logic in place is available from MDB Systems, Inc. here.

The module optionally includes three ribbon cable connectors for interconnection between the MDB-710 and external devices or other MDB modules. The interface board is priced at \$250 from the firm at 981 N. Main St., #2667.

## S/3 Called 'Worst Buy on Market'

(Continued from Page 33) age is available for \$15,000 and up.

Controllers, however, are expensive items, he said. A controller and the first floppy disk drive will cost about \$3,000, but once a user has a controller, each additional drive costs only \$1,000.

#### Software Big Item

White warned attendees "software can cost more than hardware."

Development costs are extremely high, he noted, with a real-time control system costing about 200% to 500% more than the hardware it runs on.

"If you're lucky, you can check out a new real-time control system at the rate of .5 instruction/hour. A research and

development system is somewhat cheaper and can be checked out at the rate of 1 instruction/hour," he said.

An application to solve a very well defined problem is still cheaper and can be checked out at the rate of about 2 instruction/hour, costing "only 50% to 100% more than the hardware that is used to operate it," White said.

Using an in-house dedicated minicomputer is a much more economical way to go than time-sharing, according to White, in cases where the user must maintain a large data base.

Finally, from the customer's point of view, it's probably a good idea for him to lease until he is sure he's satisfied. Only then should he purchase.

## Automates Four Functions

# Mini Streamlines Airport Duties

TURIN, Italy — Ranking third among Italian airports in volume of freight shipped, Citta di Torino airport here is pioneering an Aircraft Loading and Balancing Automation (Alba) system which uses a Hewlett-Packard (HP) 2100 minicomputer and software developed by the Aeroitalia SAS Group.

Alba was specifically designed to speed up all activities relating to flight departures at medium-size airports with up to 100 departures per day.

The system automates four major functions that previously were handled manually — aircraft weight and balance calculations, the management of outgoing freight and mail, passenger check-in and passenger boarding.

### Calculation 70% Faster

Livio Petrucci, head of the airport's operations department, said "we have achieved an impressive 70% reduction in time for calculating weights and balances."

"Data such as the number of passengers and the location and weight of freight, mail and baggage onboard is computed to determine aircraft center of gravity and take-off weight — information needed by the pilot," he explained.

"Not only can we prepare the load plans faster, but changes for calculation errors have been greatly reduced."

Petrucci also reported a 40% time savings in managing outgoing shipments of freight and mail since the system was installed last May.

"In 1975, we expect to top last year's shipments of more than 12,300 metric tons. And with Alba we will be able to handle increased shipments without adding more personnel," he said.

To the more than half a million passengers departing from Turin airport annually, the check-in procedure may not have changed drastically, but ticket agents can now provide them with accurate and up-to-the-minute flight information including space availability and wait listings.

Passengers and their baggage departing on the more than 30 daily flights scheduled by seven national and international airlines are checked in via four display terminals. Alba automatically checks passenger reservations, places the traveler on the flight list and records baggage weight.

At the boarding gates, cards issued earlier at the check-in counters are read by an optical reader which transmits the identities of all boarding passengers directly to the central system.

Receiving the data from check-in counters, boarding gates and the freight office, the system prepares the final pre-flight document — the load plan.

### Expansion Planned

"This is just the beginning," Petrucci said of the present use of Alba. "Plans for expansion include handling of non-scheduled charter, mail and freight flights and the management of incoming freight shipments."

"At present, Alba is in full operation around the clock. So there is a need for redundancy and we are planning to install a backup system by 1977."

"With the added capability, the second system might also be used to handle the general-purpose DP tasks for the airport."

Heart of the Alba system is a Hewlett-Packard 2100 microprogrammable minicomputer with 16K words of memory, a 5M-byte disk, tape punch, tape

reader and system console, all located at the Alba operation center.

Seven video displays, a teleprinter, a 200 line/min printer and an optical mark reader located at the other data input stations complete the system's hardware, which cost about \$70,000.

"Our operation and its success is carefully watched," Petrucci said, "and there are at least five Italian airports seriously interested in the system."

## Typesetting 50% Quicker With On-Line Editing Unit

PROVIDENCE, R.I. — A computer system with on-line editing features has enabled a commercial typographer here to increase phototypesetting production nearly 50% over prior levels.

With the system, Typesetting Service Co. can handle more than 100 jobs during a single eight-hour shift, compared with a maximum of 60 using the previous system without on-line editing.

The system, a Digital Equipment Corp. Decset-8000, has been in operation since January. Originally developed for newspaper typesetting operations, it was adapted for a commercial environment by DEC and Typesetting Service Co. personnel, mostly by substitution of software for display and tabular formats in place of the classified advertising package normally supplied.

According to the system is by paper tape, 90% of which is generated by keyboard perforators and the other 10% by an optical character reader. As the system reads the tape, hard copy for proofreading is produced by a line printer.

All corrections to the original copy are then accomplished through the Decset-8000's VT20 subsystem, consisting of two video display terminals and a PDP-11/05 controller.

Terminal operators call the copy needing corrections from the system's disk storage units. The VT20 subsystem stores up to 10,000 characters of copy and each terminal can scroll through 48 inches of copy without addressing the host system.

Operators can perform editing functions ranging from character and line correction to moving entire sentences or paragraphs. After editing is completed, the system outputs corrected, justified and hyphenated copy directly to two Fototronic 1200 phototypesetters.

According to Jim Higgins, Typesetting Service Co. president, the system's most valuable single improvement is its ability to avoid repunching of corrected copy.

"By assigning corrections to the video terminal operators we avoid interruption of input copy flow," Higgins said. "Under old conditions, breaking a two- or three-hour job to repunch a correction could cost a half-hour's

productivity because each correction had to be coded, punched and read into the computer."

"Editing by video terminal eliminates most of the coding and all of the tape reading and doesn't involve the input operators at all," he said.

Higgins cited the system's ability to handle several jobs simultaneously at another major advantage. "The system can read and punch tape, service the VT20 system and feed the 1200s at the same time. Our older system could only read or punch tape or justify and hyphenate one job at a time."

Typesetting Service Co. first began phototypesetting nine years ago with a key-to-magnetic-tape system that required the operator to perform all hyphenation and justification. In 1972 the company graduated to computerized typesetting with a DEC Typset-8 storage and edit system and one Fototronic 1200. The second 1200 was purchased six months later.

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#### LEGEND

1. All computer figures are taken from projections of International Data Corporation, the world's largest EDP market research firm.
2. State by state numbers are number of computer systems in state.
3. Percentage figures represent percent of total U.S. computer systems installed in state, measured by value.
4. States in lighter shading are ten largest measured by value of computer systems installed. States in darker shading and Washington, D.C. are next highest.
5. Cities shown are 1976 Computer Caravan sites. Inner circles are 100-mile radius from city. Outer circles (where shown) are 200 mile radius from city.

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## Computer Caravan/76 brings a national computer conference to key computer-using states across the country.

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# COMPUTER INDUSTRY

## CDC's Norris Charges

# Export Rules Robbing U.S. Firms of \$1.8 Billion Market

By Nancy French  
Of the CW Staff

WASHINGTON, D.C. — Confused and overrestitutive U.S. policies on computer equipment exports may rob U.S. manufacturers of an estimated \$1.8 billion opportunity to sell peripherals in Eastern Bloc countries, William C. Norris, Control Data Corp.'s chairman and chief executive officer, said here recently.

These policies have already cost U.S. manufacturers the loss of a major part of the mainframe market, he said.

"Restrictive U.S. policies have provided socialist countries the incentive to accelerate development of their own computer industry" and systems like the Ryad 1040 are the result, he said.

"They can also build more advanced peripheral equipment, and they undoubtedly will," Norris said.

However, "the rate of doing so will depend on availability, from the outside, of more advanced peripheral equipment to meet their needs."

### Hard to Tap Market

At a news conference here recently during which the Ryad 1040 was displayed but not opened for about 100 reporters and government officials, Norris explained the difficulties in tapping this market.

It would take six months to obtain a license to export to an Eastern Bloc country a U.S. computer with a performance level comparable to the 1040, Norris said.

In addition, safeguards would undoubtedly be required, such as quarterly inspections to assure the system was being used as the customer said it would, he said.

"Many persons in Washington assume

the socialist countries are far behind the U.S. in computer technology," Norris said. "They therefore assume that Soviet military capabilities could be significantly increased if the U.S. sold them computers."

"Even some government people who are concerned with the administration of the export of computers are not too well-informed," he said.

A test of the Ryad 1040 has demonstrated the sale of standard U.S. computer equipment would "not basically enhance the military capabilities of the Soviet Union," he said.

"Consequently, there is a substantial opportunity for the export of Western peripheral equipment to those countries today," he said.

Results of tests run by CDC showed the Ryad 1040 is three to four times faster than the IBM 370/145 in solving scientific types of problems. In commercial applications, the 1040 is about the same speed as the 370/145, Norris said.

However, the peripheral equipment offered with the 1040 is not as technically advanced as the mainframe itself, he added.

Eastern Bloc countries are having greater success in producing viable computer mainframes than in producing high-quality, high-performance computer peripherals, he concluded.

Since the Ryad 1040 demonstrates a

## Cooperation Begins at Home

WASHINGTON, D.C. — Control Data Corp. Chairman William C. Norris, has called for a partnership between American business and the U.S. government to undertake a program of technology exchange with the Soviet Union — at the level of \$25 billion — over the next five years.

"In the long run, exchange of technology with the Soviet Union offers the greatest business opportunity," he said.

In the three and one half years since the U.S.-USSR agreed to establish scientific and technological cooperation, no extensive exchange of technology has occurred.

"The reason is restrictions on trade imposed by Congress," Norris said.

The U.S. needs a better defined and more aggressive program to develop business opportunities with Russia and other socialist countries, he remarked.

To achieve that end, Norris suggested a program for "collecting and dis-

seminating information on the state of technology in socialist countries and the business opportunities presented."

Norris called on government and business to change their present "adversarial relationship" into a partnership and suggested the U.S. establish a definitive and aggressive blanket program with the USSR for technology exchange.

U.S. government agencies lack a full understanding of the status of socialist technology as well as the technological needs of the U.S., he said.

"Consequently, there is no government leadership in identifying opportunities and there is little help offered in qualifying export applications. The approach used is more that of challenging every aspect of an export request rather than looking for means to qualify it," he said.

The French, British, Germans and Japanese all approach export business in a mode of business-government

(Continued on Page 40)

level of performance comparable to that of medium-sized U.S. computers, the implication is that the Eastern European market for U.S.-made medium-sized and smaller computer equipment is "limited."

# GE Could Have Been Number Two: Bloch

By Edith Holmes  
Of the CW Staff

NEW YORK — General Electric Corp.'s

## IBM Export to Intourist Nixed

WASHINGTON, D.C. — The U.S. Department of Commerce has rejected IBM's application for an export license for a reservations system designed around a 370/158 and a 145.

The system was to be used by Intourist, the Soviet travel agency.

"The U.S. government concluded the system couldn't be adequately safeguarded from unauthorized use," an IBM spokesman said.

Last July, IBM received approval from Commerce to supply a 158, 10 System/7s and associated terminals and spare parts to the Soviet Union's Kama River Auto Works plant foundry (CW, June 25).

Also last summer, Commerce issued a license to Univac to supply a dual-processor 1106-II to Aeroflot, the Soviet airline.

IBM originally applied for a license for

the Intourist system in 1973, and the system was reduced from two 158s to a 158 and 145, along with Model 3330 disk drives and a number of terminals.

The spokesman explained IBM had discussed the probability of license approval with the departments of Commerce and Defense prior to submitting its application. "Although some concern was expressed with the hardware configuration of the system at that time, the government did not discourage us," he said.

"Over the past two years, we have continued a dialogue with the U.S. government and reconfigured the equipment to lessen any exposure for unauthorized use."

"We certainly understand and accept the decision that has resulted from an appropriate government review process," the spokesman said.

(GE) decision not to attack the IBM customer base by developing an advanced product line of small- to medium-sized machines was a mistake, the man charged with developing the plans for GE's APL series recently told the court hearing the government's antitrust suit against IBM.

Had GE committed itself to fighting for IBM 1130 and 360/20, 25 and 30 customers, it could have attained a 10% share of the market and the number two spot in the industry, according to Richard M. Bloch, now a consultant.

GE considered both an increased market share and industry leadership essential to its continuation in the systems business. And Bloch believed the company could reasonably attain such a market share within about seven years and second place in the industry well before the close of this century.

But GE's top management decided it couldn't compete effectively against IBM and its decision to cancel plans for the APL series coincided with the decision to merge its computer business with Honeywell's in 1970, Bloch stated.

While he wasn't certain of all the views

behind the GE exit, Bloch recalled GE management felt IBM had too much of a head start. GE would never reach the planned 10% market share from its 3% to 4% position and IBM was to be feared as the leader in the computer field.

### Investment Required

Top management may also have balked at the \$858 million investment Bloch and his team contended the APL series would have required. He estimated the proposed product line would have taken at least six years to become profitable.

During that period, beginning in 1969, GE would have had to invest \$265 million to develop the new products, another \$155 million to market them and build up its customer base and a final \$438 million to cover the "lease effect."

Having long considered himself a protagonist in challenging IBM's leadership of the industry, Bloch worked for Raytheon, Honeywell and Aurbach Associates before coming to GE in 1968.

As head of GE's Computer Division from 1947 to 1955, he was involved

(Continued on Page 41)

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## CDC's Norris Charges

# Rules Losing U.S. a \$1.8 Billion Mart

(Continued from Page 37)

East European markets for U.S. large computer imports, leaving only an export market for large special-application computers, Norris said.

Development of the five models of the Ryad series was assigned to different Eastern Bloc countries. Robotron in East Germany produced the 1040.

Although Robotron's director, Fritz Wokurka, who was present at the news conference, admitted only 50 computer systems of various types actually were built in Eastern Bloc countries in 1974, socialist technology and manufacturing capability has advanced to the point where any need "can be met by their own resources," Norris emphasized.

"Let me give you one very specific example of how U.S. computer export

policy made a competitor out of a potential customer of ours," Norris said.

In 1969 CDC asked for an export license for a graphics display system for the shipyards in Rostock, East Germany. "The export license was denied," Norris said.

In 1971 CDC was denied an option to exhibit a similar graphics system at the Leipzig Fair in East Germany.

The Hungarian Academy of Science observed the absence of the graphics display at the Leipzig Fair and proceeded to develop an equivalent unit, which it exhibited in 1972.

Norris described the Hungarian model as "more advanced" than CDC's mid-60's model — it was "built later" and used "more current technology," he said.

CDC is considering purchasing several to connect with its larger computers sold in the East because the firm is still unable to get export licenses for equivalent U.S.-manufactured devices, he said.

Norris said CDC purchased the system strictly for testing and for demonstration purposes.



Wokurka

CDC Photo by M. French  
Norris

## Industry, Government Partners Vital for USSR Technology Pact

(Continued from Page 37)

partnership. They work together, through all phases including identification of opportunities, proposals, export application

processing and financing.

In contrast, the American procedure is for the U.S. government to hold separate meetings with other governments with no involvement by U.S. business. "Often, the only way Control Data can learn the content of these government-to-government meetings is by having employees of our overseas branches communicate with the other country's representatives," Norris said.

He suggested the U.S. negotiate and establish a definite level of technology exchange with the USSR — similar to the recent grain agreement — for perhaps \$25 billion over a five-year period.

Under the terms of the overall agreement, individual companies could negotiate contracts up to the aggregate amount, Norris explained, on the condition the U.S. receive an appropriate amount of equivalent technology for that given.

Cooperative efforts with other nations will help, he said, and the Soviet Union,

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New York	Essex House	Jan. 26-27
Chicago	O'Hare Hyatt Regency	Mar. 15-16

### Data Communications Course #1020 — Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow-up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three-day seminar covers procedures, approaches, and algorithms for evaluating and cost-optimizing network operations. Total cost, including an extensive set of custom lead course materials, is \$450. Additional registrants from the same company qualify for a reduced rate of \$400.

New York	Essex House	Feb. 23-25
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## Chandeliers for CPUs

WASHINGTON, D.C. — How will the Russians pay for U.S. technology. Will the currency be "hard" — in gold or dollars — or will it be "soft" — in the coin of the realm of Poland, Czechoslovakia or whichever country is to be the recipient of U.S. products contemplated under Norris' plan?

Control Data Corp. is prepared to be paid in hops or crystal chandeliers, according to a spokesman at the recent display of the Soviet Ryad 1040.

Through its subsidiary, Commercial Trading International, Inc., CDC has the capability of bartering whatever payment it can negotiate with Eastern Bloc nations for cash somewhere else in the world, the spokesman said.

Commercial Trading is a subsidiary of CDC's Commercial Credit Co.

being the second largest industrial nation with the largest number of scientists engaged in research, offers the greatest opportunity for such cooperation.

Despite a gross national product smaller than that of the U.S., the Soviet Union has a scientific and technical establishment at least 20% greater. It includes 3,000 research establishments employing more than one million scientific workers, based on a Soviet count, Norris said.

Norris admitted the U.S. does have more technology than any other country in the world. The greatest expertise in converting technology into useful products and services. The capitalist economy rewards this type of entrepreneurial effort, he said.

The USSR, on the other hand, rewards the academician and the theoretician, who count among that nation's highest paid groups. With its huge number of scientists and engineers, the Soviet Union produced a vast amount of technology that is of a "basic, conceptual nature," Norris said, adding, "Thus the basis for a very productive cooperation exists."

To: Ed Bilde, Vice President, Editorial Services,  
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# Burroughs Chief Credits IBM's Success to Management

By Edith Holmes  
and the CW staff

NEW YORK — IBM has been successful because it has had a continuum of good management over many years, according to Ray W. Macdonald, chief executive officer of Burroughs Corp.

In addition, the corporation was in at the beginning of the office equipment business and so has tended to better understand customer needs and to adapt much of its punch card equipment to I/O devices, Macdonald said in a deposition read into the record of the U.S. vs. IBM case by Justice Department attorneys.

"IBM has experienced considerable good fortune," he stated, adding, "I don't criticize the corporation for having taken advantage of all this."

But, while he praised IBM, Macdonald's deposition offered criticisms as well. Burroughs was disappointed with IBM's 360 line at the time of its introduction because it used machine-dependent Assembly language rather than high-level languages, he noted. He testified Burroughs had hoped IBM would take the lead in this area.

Much of the 360 line's success stems from IBM's ability to sell the public the

## GE Could Have Been Number Two: Bloch

(Continued from Page 37)

with the paperwork for its Raycon, a business-oriented machine, and led the team accomplishing much of the development of Honeywell's H200 line.

Bloch indicated he felt frustrated with the actions of GE's top management because he had confidence in the company's history in the field and his own ability in similar circumstances "to launch successful programs against the industry leader."

The resources — financial and otherwise — were much greater at GE than were those available to him elsewhere, he added.

Finally, in retrospect, he contended that in emphasizing small machines and networking, GE's plans for the APL correctly anticipated developments in the evolution of semiconductors, the marriage of communications and computers and the advent of distributed processing.

At the same time, he also expressed his admiration for the "splendid management" at IBM. Bloch attributed IBM's success to its sustained effort to be a paramount element in the business equipment field.

IBM manifested a greater dedication — "commitment and resolve to succeed" — than did either Sperry Rand, from which it captured the industry lead in 1953 or '54, or GE, Bloch said.

He added IBM did not have the resources of either of these companies when it entered the systems business in the early 1950s.

notion of compatibility within a "family" of computers rather than to any technological breakthroughs, Macdonald said.

### Burroughs to Prosper

With regard to Burroughs, Macdonald said it will survive and prosper, regardless of whether IBM is eventually broken up into four or five companies as a result of this case or congressional legislation. He expects Burroughs to keep growing at about 15% each year in revenues.

Making four or five companies out of IBM would be asking for domination by all of those companies, he said. They will all put out the same equipment and advocate the same approaches in the marketplace.

But Macdonald added he believes users should be free to choose the best, most cost-effective equipment they can. And there are elements in the industry which could enter the marketplace successfully

with their modest resources if IBM was not there, he said.

Describing his company, Macdonald said Burroughs also had its roots in the early tab card business. In the mid-1950s, the corporation set out to broaden its range of products and extended its manufacturing facilities and marketing force. Macdonald also said the firm gradually shifted to a line of business approach during this time period.

Asked to describe Burroughs' competitors in medium-to-large-scale systems, he identified IBM, Honeywell Information Systems, Control Data Corp. and Univac. NCR Corp., Nixdorf, Philips, Fujitsu and Hitachi are the company's chief competition in the intermediate to smaller size mainframe arena, he added.

Minicomputer manufacturers have provided little competition until recently primarily because minicomputers were a minor factor in the marketplace until the

last two years, Macdonald said.

The Burroughs executive viewed peripherals companies as OEM suppliers rather than competitors in the end-user marketplace. Many of Burroughs' peripherals are built to its specifications by peripheral manufacturers and are marketed with the Burroughs trademark, he noted.

Recently, however — but to a small degree — the company has encountered some direct competition from the peripherals makers in the end-user business DP field, he testified.

Service bureaus compete rather extensively with Burroughs, Macdonald continued, because users see them as alternatives to their acquisition of small or medium-sized systems.

Time-sharing services, on the other hand, tend to be very specialized in the application areas they offer to users and so don't compete directly, or really indirectly, with Burroughs, he said.

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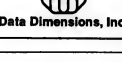
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## IBM 'Blessing' of Front End Rescues CCI

By Patrick Ward

OF THE TWO SUE? TORRANCE, Calif. — IBM's introduction of its 3705 communications controller helped Ili Computer Communications, Inc. (CCI) out of bankruptcy proceedings to two straight years of profitability, according to President Raymond E. High.

The 3705 introduction "blessed the front-end concept" just as CCI was veering toward Chapter 11, said Charles B. Bailey Jr., vice-president of marketing.

Before the 3705 came along, CCI "had been trying to sell front ends to people who had never heard of them," Bailey said.

The company has now climbed back from its reorganization in late 1973 to early 1974 and has enjoyed two profitable years in a row for the first time in its history.

CCI now has 113 full-time employees and a three-year agreement to supply Memorex Corp. with front-end processors.

The company's \$4.5 million volume last year should double to about \$9 million this year, High said.

"CCI had been doing very well back in the late 1960s," he recalled. But "during the 1969-1970 time frame, it was fashionable to make acquisitions of other companies. CCI made three, all of which turned out unfortunately," High said.

In conjunction with the announcement of its first front-end processor system in 1970, CCI started work on a large, on-line nationwide stock-brokerage network.

"This was a very expensive effort," High said. "When the client collapsed in 1971, we had a multimillion-dollar development project 80% complete and no customer," High said.

CCI decided to complete the project and try to market it to other major brokerage firms.

"But none would put their livelihood in the hands of a small organization of 80 people," he said. CCI finally sold the system to the Midwest Stock Exchange "on unfavorable terms."

Meanwhile "the subsidiaries were causing a substantial cash drain on the company," High continued.

CCI tried to offer convertible debentures in the fall of 1972, but that effort failed, and the company withdrew them in early 1973.

"It then became known in the industry that CCI was in trouble," High said. It was very difficult to market front ends to customers who were planning to use the equipment for five years or so and weren't sure we'd be around then," High said.

In June of 1973, the company was \$5 million in debt. The original president and founder of the company left office, he said. "We had 149 people and paychecks bouncing all over the place," High said. "We were coming in on weekends with wires and kids to clean the building."

"We cut the staff from 149 to 78, promising them that if we did make it, they'd be reemployed."

bursed, since we couldn't pay the 78 either."

There were efforts to sell CCI to gain financing, but on Aug. 23, 1973, the company filed for bankruptcy.

"We started meeting with the creditors and went through Chapter 11 in six months and came out on our own with no new financing," High said.

"We gave unsecured creditors one share of CCI stock for every \$3 of debt. And we restructured our due bank loan of \$2.2 million into a five-year repayment," he said.

"We were fortunate in that we had an existing customer base whose networks were expanding. Some placed orders just to help us get through the period," he said.

Not only has the company made a profit for two straight years for the first time in its history, but it has the largest backlog in its history right now, High said.

That backlog grew when Memorex placed a three-year order for CCI CC-40 front ends this spring. Memorex markets the device as its 1380 front end.

The CCI/Memorex contract is more than an OEM agreement, High said. The pact contemplates joint enhancements to current products and joint development of a future product line, he said.

CCI also gets optional access to the Memorex service organization for field support of the CCI product line.

## Orders & Installations

Winn-Dixie has ordered 994 Model 2100 portable data entry terminals from MSI Data Corp.

The city of Redondo Beach, Calif., has installed a Microdata reality system to provide an on-line municipality data base capability.

International Components Corp. has installed a Burroughs B-1712 system.

Remote Service Unit Ltd., an organization of 21 Wisconsin savings and loan associations, has ordered Cash Plus, an electronic funds transfer system from NCR which includes 35 NCR 279 terminals.

Computer Information Corp. has installed a Univac 90/30 system.

The Financial Systems Group of Digital Equipment Corp. has installed Sofco, Inc.'s Basic Business Language on two of its in-house Decsystem 10s.

Central National Bank of Cleveland has installed The Capacity Meter, a computer measurement system manufactured by CRU, a subsidiary of Computer Resources, Inc.

Accurate Data On-Line, Inc., a DP service bureau for credit unions, has installed a Burroughs B2700 for use with on-line credit union applications.

The first installation of Harris Corp.'s S220 computer system will be made at the University of Illinois at Urbana-Champaign. Its prime function will be to provide an on-line computational capability while concurrently backing up three minicomputers involved in a research project of collecting and analyzing brain waves.

Famous Artists Studios ordered a Univac 90/30 system for maintaining mailing lists and distribution records.

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## DEC Repackaged Systems

By Edith Holmes  
Of the CW Staff

NEW YORK—Digital Equipment Corp.'s efforts to cater to the end-user business DP market in the '70s meant repackaging and reprogramming its PDP-8, PDP-11 and Decsystem-10, according to Winston Hindle, a senior vice-president with the firm.

Testifying as a government witness in the U.S. vs. IBM antitrust trial, Hindle told the court DEC changed the console appearance of these machines to accommodate office environments and adopted languages such as Dibal, Basic and Cobol to enable the processors to handle business applications.

And, to make the PDP-10 more competitive with IBM's medium range 360 machines—chiefly the models 30, 40 and 50—DEC also improved the quality of that machine's batch-processing abilities. The 10 also acquired peripherals more acceptable in a business DP environment.

Thus "redone," the PDP-8, PDP-11 and PDP-10 became the Datasystem 500, the Datasystem 500 and the Decsystem-10, respectively, when introduced to the business DP market, Hindle said.

He said, The 300 runs on Dibal, the 500 on Basic and the 10 on accommodate Cobol, he added.

### Concerned With Compatibility

In addressing this end-user market, DEC has also had to be more concerned with the degree to which its machines are compatible with each other, according to the vice-president. He told the court DEC "would like to extend the compatibility of its machines across family lines and plans to do so."

"This would give us a marketing advantage and would eliminate reprogramming when moving to larger machines," he said.

At present, he indicated the PDP-8 family is software-compatible upward, but not downward software-compatible, and not all of its peripherals are 100% compatible with every processor in this group.

The PDP-11 family is similarly software-compatible upward, but not compatible downward among its members. Peripherals on the PDP-11s are completely upward compatible and, to some extent, downward compatible.

## Ryad 1040 Product Pitch Similar To Those of American Vendors

By Nancy French  
Of the CW Staff

WASHINGTON, D.C.—During the recent Control Data Corp.-sponsored display of the Ryad 1040, built in the German Democratic Republic, Robotron Director Fritz Wokurka described the products of the two nationally owned companies, Robotron and Zenitron—in terms much like those found in the product literature of U.S. computer and peripherals manufacturers.

The name Robotron stands for modern and efficient electronic computing equipment," Wokurka's translator said.

"An experienced staff of qualified workers, engineers, scientists and economists" has succeeded in developing and producing "high-quality" products for

use in all fields.

The operating system, OS/ES, guarantees to utilize the data processing system in an efficient way, he said, adding that the 1040 also boasts a "favorable price/performance" proportion.

"We are aware that computer manufacturers are judged by the range of system-technical service offered," he said, adding that "it is an important prerequisite to solutions which are above average and are satisfying in the long run."

The company offers technical-economic consultations, shipment, installation and commissioning of system configurations, technological equipment, testing and measuring instruments, DP accessories and training at the training center of the company as well as comprehensive technical service.

Citing the now-familiar pitch of the satisfied user as testimony to the quality of the Robotron product, Wokurka's speech mentioned Soviet organizations such as the joint center of nuclear research in Dubna and the Institute of Space Research.

## Tymshare to Purchase Division of Leasco

CUPERTINO, Calif.—Tymshare, Inc. has agreed to acquire the business and operations of the U.S. time-sharing division of Leasco Response, Inc., a subsidiary of Reliance Group, Inc.

Terms of the agreement called for the payment by Tymshare of cash based on the retention and growth of volume in future years.

The agreement marked Reliance's exit from the time-sharing business, having sold off its UK business to on-line Systems, Inc. of Pittsburgh, Pa.

Tymshare President Thomas J. O'Rourke explained that the move gives Tymshare entry into Cleveland and boosts its position in Pittsburgh.

The agreement does not call for an exchange of hardware, and O'Rourke said he plans to run the Reliance work on Tymshare's Xerox Corp. 940s.

Conversion from Leasco's Hewlett-Packard 2000s did not seem too difficult, he said, since they use Basic, which is essentially a "subset" of the Superbasic Tymshare 940s use.

"Basically we bought the business and customers plus some people," he said.

John T. Leatham, Reliance's executive vice-president, said, "Reliance Group first entered the time-sharing business in 1969 as part of its program to provide a full line of computer-related services."

"However, operations failed to perform to expectations, and significant additional capital investment would have been required to continue operations into 1976 and beyond."

## COM Sales to Grow Through '79

SAN JOSE, Calif.—Although recent growth in the microfilm equipment market has not been as high as industry expectations, sales of computer output microfilm (COM) recorders, readers and reader/printers should increase through 1979, according to a report by Creative Strategies, Inc., a California-based market research firm.

The past five years, while not living up to expectations, have served to educate the potential user on the many advantages microfilm has to offer, the firm said.

Worldwide sales of COM recorders, readers and reader/printers by U.S. manufacturers should reach \$496 million in 1979 from \$139.2 million in 1974 for a compound annual growth rate of 28.9%, the report said.

Domestic consumption accounted for 77% or \$107.4 million, of the 1974 total and will account for 69%, or \$341.2 million, in 1979. The foreign market is growing at a slightly faster rate than the domestic market because of the rising interest in microfilm overseas.

COM recorder shipments of \$52.2 mil-

lion valued on an f.i.d.-basis in 1974 will increase 30.7% annually to \$199 million in 1979, CSI predicted.

Alphanumeric COM recorders represented the largest segment of the COM market with 82% of the total value of recorder shipments in 1974, the study indicated.

The research firm predicted off-line units with a front-end processor will exhibit the largest growth in this sector.

Stromberg Datagraphix, Inc., with over 35% of the total COM installed base, competes with other major companies for the "middle ground" uses of COM, and Memorex Corp. is the leading manufacturer in the on-line segment, the report said.

At the high-price micropublishing level, Information International has a major share of the market with Singer Micrographic Systems its only significant competitor.

COM manufacturers also compete on a larger scale with computer printer and CRT terminal manufacturers and currently command only 3% by value of the computer output market, according to the report.

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329-1740.

# Service Firms Report Quarter Results Up

Automatic Data Processing, Inc. (ADP) and Tymshare, Inc., two service firms making news with acquisitions, reported increased results for the quarter ended Sept. 30.

ADP achieved record revenues and earnings in its first quarter. Revenues rose to \$41.3 million compared with \$34.6 million in the same period last year.

Earnings totaled \$3.6 million or 51 cents a share compared with \$2.9 million or 41 cents a share in the same period last year.

Results for the 1974 period were restated for the acquisition of Cyphermetrics Corp. on a pooling-of-interests basis.

"We are encouraged by the results of the first fiscal quarter and are increasing our estimate

of earnings per share improvement for the year to about 20%," President Frank R. Lautenberg said.

ADP has completed its acquisition of Financial Computer Services, Inc. of Fremont, Ohio, for nearly \$2 million in cash, he said. ADP also has signed a contract to take over the payroll DP business of Manufacturers Hanover Corp. and has agreed to acquire the Delos International Group, Inc. [CW, Nov. 26].

## End of Astros Drains MSI Quarter Net

COSTA MESA, Calif. - Reflecting charges resulting from its decision to abandon the Astros point-of-sale line and lower

Tymshare had a 42% gain in earnings on a 20% increase in revenues for its third quarter over the same period last year. Results for the nine months were also improved.

Earnings totaled \$1.2 million or 30 cents a share compared with \$823,738 or 22 cents a share for the third quarter last year.

Revenues rose to \$14 million for the quarter, up from \$11.8 million for the same period last year.

equipment sales, MSI Data Corp. showed a second-quarter loss of \$1.3 million or 69 cents a share compared with earnings of \$423,564 or 22 cents a share in the same quarter last year.

Revenues for the firm declined to \$7.2 million in the three months ended Sept. 27 from the \$8.4 million in the year-ago period.

The discontinuance of the Astros business resulted in an estimated \$1.4 million loss after taxes, which was taken during the second quarter.

For the six months, revenues were nearly even at \$15.4 million compared with \$15.8 million in the year-ago period. Losses totaled \$1.1 million or 23 cents a share compared with

the amounts for both quarters include the results of operations of United Data Centers, Inc., which was acquired by Tymshare in December 1974 and accounted for as a pooling of interests.

During the nine months, revenues climbed to \$42.1 million compared with \$34.4 million in the same period last year.

Earnings rose to \$3.5 million or 91 cents a share compared with \$2.4 million or 65 cents a share in the year-ago period.

earnings of \$742,250 or 55 cents a share.

During the 1974 period there was a credit of nearly \$100,000 resulting from a change in accounting for applying overhead costs.

Equipment sales have been slow because of recessionary influences, according to W.J. Schults, president. Although MSI's order rate has been improving in recent weeks, total backlog at Sept. 27 was \$8.6 million compared with \$16.3 million at the same time last year, he noted.

The firm has maintained a positive cash flow and has reduced its outstanding bank loans from \$10.5 million at the end of March 1975 to \$3.9 million.

## Wang Revenues Up In Quarter, Shipments Grow, But Earnings Dip

TEWKSBURY, Mass. - Although first-quarter revenues rose 15% at Wang Laboratories, Inc., the gain was not translated into increased earnings.

Earnings declined to \$682,000 or 17 cents a share compared with \$878,000 or 22 cents a share in the same period last year.

Revenues rose to \$18.1 million compared with \$15.8 million in the year-ago quarter.

During the period, the company's international shipments

grew 24%, but a "substantial quantity of equipment was not shipped to our subsidiaries in the period for shipment by the end of the quarter," the firm said.

"Depletion of our production pipeline by record-breaking June shipments, coupled with summer vacations of production workers, caused a temporary production delay."

North American shipments grew about 10% and were very close to the quarter projections. Expenses for domestic operations were also in line with projections, the firm said.

The overall inventory order rate was up 5%, with international strength more than making up for a small drop in North American orders, according to the firm.

During the quarter Wang extended through 1978 its \$24 million revolving credit agreement with four banks.

The company also bought an 81,000-sq-ft facility on six acres of land in Burlington, Mass.

During the quarter Wang was able to substantially complete the recall of the production employees laid off in December 1974, the firm said.

President A. Wang said he views IBM's S/100 as greatly expanding the low end of the technical marketplace by bringing the benefits of computerization to the attention of many more potential customers and feels it will open many doors for broader sales of Wang's System 2200.

## Decision Data Sags in Nine Months

HORSHAM, Pa. - Decision Data Computer Corp. reported losses for the third quarter and nine months, which President Loren A. Schultz attributed primarily to the continued deferral of orders by OEM customers.

In the third quarter, the firm lost \$663,000 or 18 cents a share, including a charge of \$192,000, compared with earnings of \$413,000 or 11 cents a share in the same period last year.

The charge was a write-off of Decision Data's 15% investment in International Engineering Ltd.

Revenues for the quarter de-

clined to \$7.6 million compared with \$10.8 million in the period ended Sept. 30, 1974.

For the nine months, however, revenues rose to \$30.4 million compared with \$27.9 million in the same period last year.

The loss totaled \$170,000 or 5 cents a share compared with earnings of \$824,000 or 22 cents a share in the year-ago period.

"Management is taking aggressive austerity measures to assure the company both weathers this difficult period and emerges stronger and better able to meet the challenges of the future," Schultz said.

## First-Quarter Loss Expands at SEL

FORT LAUDERDALE, Fla. - Systems Engineering Laboratories, Inc. (SEL) showed increased losses during the first quarter ended Sept. 26, but the president said the company still anticipates profitability for fiscal 1976.

The loss was anticipated, President A.G. Randolph said, President

resulted from a phaseover in production from old to new product lines.

Revenues dropped to \$2.8 million from \$4.5 million in the same period last year, while losses grew to \$542,439 or 21 cents a share compared with \$109,819 or 4 cents a share in the year-ago quarter.

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## New Registrations

DATA DOCUMENTS, INC., 4205 S. 96th St., Omaha, Neb. 68127, manufacturer and retailer of DP in station supplies, filed to register \$4 million of notes, Series A, due 1982, which are to be sold at 10% of their principal but accreted.

Underwriters are Chase, Hilder, Co., Inc., 1300 Woodmen Tower, Omaha, Neb. 68102.

DATA 100 CORP., 7225 Washington Ave., South, Edina, Minn. 55435, a manufacturer of remote data processing systems and batch terminals, filed to register 75,000 shares of common offered for sale by the company in exchange for outstanding

common of Iomer, Inc. at the rate of one common share for each approximately 45 common shares of Iomer. 5,000 shares will be issued in connection with the exchange offer. No underwriter is involved.

MCI COMMUNICATIONS CORP., 1180 17th St., N.W., Washington, D.C. 20036, a business and data communications firm, filed to register seven million shares of common and 100,000 shares of preferred stock. One share of common, to be offered for sale in units, each consisting of two shares of common and two shares of preferred stock, will be sold at \$10.00 per share. MCI & Co., Inc., 30 Broad St., New York, N.Y. 10006.

## Earnings Reports

Computerworld  
Sales Offices

## COMPUTER AUTOMATION

	1975	1974
Shr Ernd	\$31	\$
Revenue	6,886,397	5,136,5
Earnings	501,573	195,2

**COMPUTER INVESTORS GROUP**

Three Months Ended June 30		
	1975	1974
Revenue	\$7,213,919	\$6,484,927
Loss	511,481	227,671

## MOSTEK

	1976	1975
Revenue	\$9,396,898	16,170,000
Expenses	(6,650,677)	13,300,000
Surplus	\$2,746,221	2,870,000

**COMPUTER SCIENCES**  
Three Months, \$9,900; First \$2,995

	1975	1974
Shr Ernd	\$8.12	\$8
Revenue	53,546,000	42,546,000
Earnings	1,723,000	856,000
6 Mo Shr	.23	.23
Revenue	103,913,000	82,279,000
Earnings	3,247,000	1,441,000

## Three Months Ended Sept. 30

	1975 (000)	1974 (000)
Shr Ernd	\$3.32	\$3.23
Revenue	3,600,117	3,125,243
Earnings	495,245	477,273
\$ Mo Shr	9.41	9.45
Revenue	10,368,447	9,387,021
Earnings	1,401,238	1,391,101

to Shr	.....	
venue	33,396,043	43,481

NUCLEAR DATA		
Three Months Ended Aug. 31		
	1975	1974
Earnings	\$0.03	\$0.02
Revenue	3,710,328	5,571,000
Operating Costs	38,000	40,000

arnings	40,830	20
to Shr	.26	

Revenue	7,218,151	10,627,000
Acc Cred	123,000	180,000
Earnings	228,992	480,000

INTRONICS DATA COMPU

## Three Months Ended Sept. 3, 1976

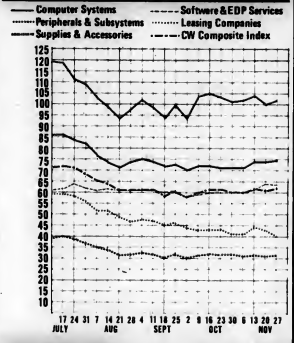
	1975	1976
Earnings	\$45	\$45
Revenue	11,202,565	10,244,000
Expenses	2,142,802	1,810,000

## ELECTRONIC MEMORIES & MAGNETICS

Ernd	1975	1976
enue	\$21,145,000	27,870,000

ings	(1,432,000)	1,311
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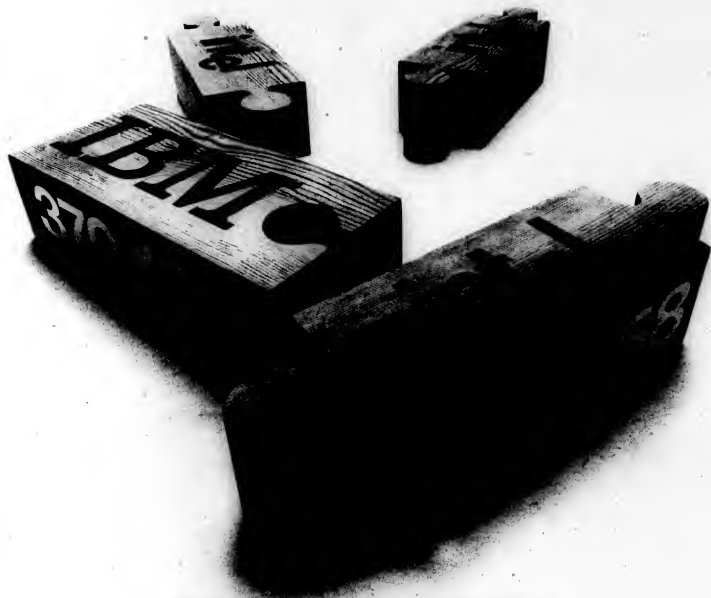
Revenue	70,043,000	65,487
Cred		2,298
nings	(1,692,000)	5,221



## Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, NOVEMBER 25, 1975

PRICE										PRICE									
1975 CLOSE										1975 CLOSE									
RANGE NOV 25										RANGE NOV 25									
H	1975	CLOSE	NET	PERK	NEED	PCT	CHG	CHG	CHG	H	1975	CLOSE	NET	PERK	NEED	PCT	CHG	CHG	CHG
	111										111								
COMPUTER SYSTEMS										SOFTWARE & EDP SERVICES									
N NUMEROUS COMP	42-100	83 1/2	+2	+2.4						O ADVANCED COMP TECH	1-1	1 3/8		-1/8	-11.1				
O COMPUTER AUTOMATION	2-11	9 7/8	-1/4	-2.4						A APPLIED DATA SYS	1-1	1 3/8		-1/8	-11.1				
O DATA GENERAL CORP	10-30	13 1/4								N AUTOMATIC DATA PROC	30-65	59 1/4		1/4	1.7				
O DATA GENERAL CORP	10-30	13 1/4								O DIGITAL DATA SYS	2-6	3 1/2		0	0				
O DIGITAL CORP	1-6	2	+2	+33.3						O DIGITAL DATA SYS	2-6	3 1/2		0	0				
O DIGITAL CORP	1-6	2	+2	+33.3						O ELECTRONIC ASSOC	2-10	7 1/4		1/4	5.0				
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O ELECTRONIC ENGINEER	2-10	7 1/4	+1.3	+1.3						O ELECTRONIC ENGINEER	2-10	7 1/4		1/4	5.0				
O ELECTRONIC ENGINEER	2-10	7 1/4	+1.3	+1.3						O ELECTRONIC ENGINEER	2-10	7 1/4		1/4	5.0				
O ELECTRONIC ENGINEER	2-10	7 1/4	+1.3	+1.3						O ELECTRONIC ENGINEER	2-10	7 1/4		1/4	5.0				
O ELECTRONIC ENGINEER	2-10	7 1/4	+1.3	+1.3						O ELECTRONIC ENGINEER	2-10	7 1/4		1/4	5.0				
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